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# Block Chain Technology and Its Emerging Significance

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**Abstract:**
Block chain technology is a decentralised, distributed ledger that stores the record of ownership of digital assets, any data stored on block chain is unable to be modified, making the technology a legitimate disruptor for industries like payments, cyber security and health care. Block chain technology has the potential to revolutionise interaction between governments, businesses and citizens in a manner that was unfathomable just a decade ago. Block chain has emerged to become a potentially transformative force in multiple aspects of government and private sector operations. Its potential has been recognized globally with a variety of international organisations and technology companies highlighting the benefits of its application in reducing the costs of operations and compliance, as well as in improving efficiencies .Future of Blockchain in the Finance Industry, Cybersecurity, Digital Advertising, Supply Chain Management and so on will ensure transparency in governance, ensure less cybercrime, to promote marketing, reduce the human error with less cost and time. The study objective is to identify the country which supports blockchain, influencing factors and its impact on future of block chain. To achieve this objective, case study method is used, five different cases are taken to prove how the blockchain methodology support the managerial functions in various aspects. The study findings are supported by the advantages of using blockchain, how it helps the nations to reduce the time taken to accomplish the goals with transparency, to maximise the efficiency by adaptation of blockchain technology and to reduce the human intervention thereby reducing the prevalent cyber crime.

**Keywords:** Blockchain technology, case study, cybercrime, human intervention, transparency

**Introduction:**
Block chain technology is a decentralised, distributed ledger that stores the record of ownership of digital assets, any data stored on block chain is unable to modified , making the technology a legitimate disruptor for industries like payments, cyber security and health care.

One key difference between a typical database and a blockchain is how the data is structured. A block chain collects the information together in groups ,known as blocks, that hold set of information. blocks have certain storage capacities and record information on a timestamped chain that extends infinitely. New data is added to the end, and once added, it is permanent. Older data can be neither be removed nor modified because a snapshot of it is captured in the blocks of data that come after it.

Block chain technology has the potential to revolutionise interaction between governments, businesses and citizens in a manner that was unfathomable just a decade ago. Block chain has emerged to become a potentially transformative force in multiple aspects of government and private sector operations. Its potential has been recognized globally with a variety of international organisations and technology companies highlighting the benefits of its application in reducing costs of operations and compliance, as well as in improving efficiencies.

**REVIEW OF LITERATURE:**
Karim Sultan et al.,(2018)[1] said that data stored via blockchain is more secure than its centralised server counterpart. Because data is not stored in a single server, there is no single access point in which data is singularly stored and easily hackable. Centralization of information has and will continue to leave information exposed to potential hacks.

Ray King (2019)[2] specified that each node is an access point which verifies the transaction recorded in the block; over half of the nodes would have to be changed to submit a fraudulent transaction. Simultaneously changing over half the nodes held on the private devices by different people by the time the transaction would be processed is impossible. Blockchain is

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secure from third-party manipulators who would intercept a transaction, but if a third party has access to a user's private key, that actor can transact and manipulate a user's account, much like stealing a password to a bank or another secured account.

Mike Orcutt, (2019)[3] stressed that if a transaction is done with one person's private key and is verified by the network, it cannot be voided or undone, even if it was done in bad faith. Adrianne Jeffries(2013)This system makes the security of a private key of the utmost importance for a blockchain user. SURVEILLANCE SELF-DEF. (May 9, 2018) specified that however, private keys are not as easily decoded as a normal password.293 If a hacker wanted private information from an account on a blockchain network, he or she would not only need the public key, but also the private key.

Mike Orcutt, (2019)[4] pointed out that one of the features that makes blockchain so secure is also what makes it energy inefficient. Because of the constant verification between all nodes on a network, or "mining," blockchain technology uses large amounts of energy compared to traditional central server technology. This is called a "proof of work" system and is the customary verification process for blockchain applications.

SAWTOOTH,(2016)[5] NOR. REFUGEE COUNCIL, SYRIAN REFUGEES (2017) reported that Central government-sponsored covering or converting legislation in a refugee's country of exile can address these issues only when the refugee has already been granted entrance into that country.123 Without proper documentation, however, refugees will have a difficult time proving their identities and central governments will have a harder time balancing national security and the global forced-migration epidemic.

Corin Faife(2017)[6] The blockchain refers to a formation of grouped transactions that are publicly visible on the distributed ledger, which is a record that each member of the network can access. When a transaction is made, it is timestamped and recorded in the system. Once a transaction is recorded, it cannot be changed or retracted. Networked transactions are stacked together into a "block," which is then encrypted using a cryptographic hash and distributed to everyone in the ledger.

Samer Aburass (2017)[7] Refugees need access to valid identification documents. Without their own government to assist them, however, they need a non-centralized identification system which would contain basic information to prove who they are and their country of birth or origin. Note, however, that refugees are not the only population lacking identification cards. Over one billion people globally lack formal identification documents.

Samer Aburass (2017)[8] Nations has addressed this by including universal identification documents for all by 2030 in its Sustainable Development Goals.

Justine Humenansky (2019)[9] suggested a universal identification system would not be distributed based on rights or from a central government, unlike our current system. Private and public sector organisations have joined to develop identification systems via blockchain technology.( Alliance, ID2020).

**History of Block chain:**
Blockchain was first introduced in 2008 as the distributed ledger behind bitcoin transactions.

**1979-2007: Creation of blockchain and the early years:**
One of these technologies is the Merkle tree, named after computer scientist Ralph Merkle. Merkle described an approach to public key distribution and digital signatures called "tree authentication" in his 1979 Ph.D. thesis for Stanford University. He eventually patented this idea as a method for providing digital signatures. The Merkle tree provides a data structure for verifying individual records.

David Chaum described a vault system for establishing, maintaining and trusting computer systems by mutually suspicious groups in his 1982 Ph.D. dissertation for the University of California, Berkeley. This was a system that embodied many of

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the elements that make up a blockchain. Chaum is also credited with inventing digital cash, and in 1989, he founded the DigiCash corporation.

In 1991, Stuart Haber and W. Scott Stornetta published an article about timestamping digital documents. The article proposed a solution for preventing users from backdating or forward-dating electronic documents. The goal was to maintain complete privacy of the document itself, without requiring record-keeping by a timestamping service. In 1992, Haber and Stornetta updated the design to incorporate Merkle trees, which enabled multiple document certificates to live on a single block.

The concept of proof-of-work (PoW) was also introduced in this era to verify computational effort and deter cyberattacks. This gave way to hashcash, a PoW algorithm that provides denial-of-service counter measures. Adam Back introduced hashcash in 1997 to limit email spamming. Then, in 2004, Hal Finney introduced reusable PoW, a mechanism for receiving a non-exchangeable -- or non-fungible -- hashcash token in return for an RSA-signed token. The PoW approach plays a vital role in bitcoin mining.

**2008-2009: Bitcoin and blockchain get their start**

In 2008, Satoshi Nakamoto published a white paper introducing the concepts behind bitcoin and blockchain. Nakamoto is thought to be a pseudonym used by the individual -- or group of individuals -- who proposed the technology.
Blockchain infrastructure would support secure, peer-to-peer transactions without the need for trusted third parties such as banks or governments, according to white paper. Nakamoto's true identity remains a mystery, but there has been no shortage of theories.

The bitcoin/blockchain architecture introduced in 2008 built on technologies and concepts from the previous three decades. Nakamoto's design also introduced the concept of a "chain of blocks." This made it possible to add blocks without requiring them to be signed by a trusted third party. In fact, Nakamoto defined an electronic coin as a "chain of digital signatures," where each owner transfers the coin to the next owner. According to his white paper, this is done by "digitally signing a hash of the previous transaction and the public key of the next owner and adding these to the end of the coin."

In 2019, Walmart launched a supply chain system based on the Hyperledger platform. Amazon announced the general availability of its Amazon Managed Blockchain service on AWS. Blockchain research and development took centre stage as organisations embraced blockchain technology and decentralised applications for a variety of use cases.

In 2020, Nearly 40% of respondents incorporated blockchain into production, and 55% viewed blockchain as a top strategic priority, according to Deloitte's 2020 Global Blockchain Survey. There was a growing interest in combining blockchain with AI to optimise business processes. Throughout these five years, there was a growing interest in using blockchain for applications other than cyber currency. This trend continues into 2021 as governments and enterprises look to blockchain to handle a variety of use cases. This includes voting, real estate, fitness tracking, intellectual rights, the internet of things and vaccine distribution. Moreover, multiple cloud providers now offer blockchain as a service, and the demand for qualified blockchain developers is greater than ever.

**The future of blockchain technology:**

Trying to predict the future of any technology is never easy, and blockchain is no different -- especially since its history is so short. However, if blockchain continues on its current path, it affects many industries -- including retail, mining, travel, healthcare, education, agriculture and entertainment. The biggest effect might be in financial services, especially with the growing movement toward decentralized finance, which uses permissioned blockchains to handle complex financial use cases. Governments will also likely continue to embrace blockchain.

As universities, governments and private corporations continue to research and invest in blockchain, the technology will only improve. But they must first address the challenges that blockchain brings -- particularly regarding security, privacy,

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scalability and interoperability. Blockchain is also not suited to every use case, and businesses must evaluate deploying it before investing in the technology and putting it into production.

Future of Blockchain in the Finance Industry is the matter of tracking financial properties, Blockchain technology has kept its promise as well as shown consistency. Several financial institutions have invested in this technology after recognizing its potential and beneficial impacts because of its transparent ledger system, Blockchain can tackle the flow and dealings of black money flow. Governments are considering it as an option to have more efficient regulations over the countries' economies.

Future of Blockchain in Cybersecurity Blockchain majorly lies in the field of Cybersecurity. Although the Blockchain ledger is open and distributed, the data is secure and verified. The encryption is done through cryptography to eliminate vulnerabilities such as unauthorized data tampering.

Use of Blockchain in Digital Advertising is that Owing to the challenges faced by digital advertising, including bot traffic, lack of transparency, domain fraud, inefficient payment models, etc., promoters and publishers have a difficult time due to the bad players. Through its transparency and reliability, Blockchain has been found to resolve such issues in the supply chain. Advertisement-related transactions can be better dealt with by employing this technology.

The use of blockchain under Supply Chain Management can reduce time delays and human errors and monitor employment, costs, and releases at each step of the supply chain. Through traceability, Blockchain can also ensure the fair trade status and legitimacy of products. Blockchain has the potential to prevent the loss of revenue from black- or grey-market products and avoid reputational damage as well.

The next future of block chain is National Digital Currencies by Governments, Cryptocurrency is considered one of the most appreciated properties available in the market. The value of Bitcoin is not defined by the basic concept of demand and supply. The demand for Bitcoin will again go up even with the fixed limit of 21 million units of Bitcoin. Due to this reason, governments are expected to create their own digital currencies and participate in an open market. This national digital currency can also be the future scope of Blockchain technology.

Blockchain Integration into Government Agencies can further help in the administration of very large quantities of data, which can be very useful for government agencies. The implementation of Blockchain will make for an effective data management system with the power to drive improvement in the functioning of these agencies.

**Result and Discussion:**

**FIRST CASE STUDY - "Refugees in finland and blockchain"**

There are so many countries that implement Block chain for various reasons. But Finland has used this one to help the refugees who are staying in Finland. There are millions of people who seek to take asylum in other countries like People from war-stricken Syria who try to seek asylum in Greece, people from Venezuela , which is suffering from hyperinflation. Usually refugees don't get the loans because the bank has no record of their past behaviours. Hence it is impossible for a refugee to thrive in a new country.

This case study proves to be the best demonstration of our first objective which is to identify the country which supports block chain. The refugees in Finland are happier than most citizens of other countries. This is because Finland uses an application of blockchain called Small Contracts, to help with the refugees' settlement. In place of using traditional hand out cash disbursements, the Finnish Immigration Service partnered with MONI, a local startup. They came up with prepaid Mastercards for refugees who do not have bank accounts.

Refugees' proof of identity takes weeks, sometimes even months to be processed. They have to start from zero in a totally new country so the government provides them subsidies just so that they can survive in the country. But some of them don't

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get their identity at all, some misuse government provisions by misusing their identity . Sometimes the identity of the refugees are even purposefully destroyed so that they can be forced in to prostitution, child labour and other horrific things.

Moni services has enabled the asylum seekers to have an identity and has also enabled them to contribute to the economy as soon as possible. The various subsidies are updated in the Mastercard facilitating the easy use of the card for getting subsidies in provisions, gas and various other commodities. This tracks the refugees' growth thereby allowing the revocation of the subsidy when the particular person has started making money and no longer needs a subsidy hence by-forth it supports our second objective which is to see how it influences the user to be a part of a block chain.
In India, refugees are not supported like this, they are treated as bond servants and not having contractual capacity, Treatment of refugees has been inconsistent, ad hoc, and ambiguous. Many Indian laws are not applicable to them like Finland, countries like India adopted the Block chain concepts to their refugees they also happy and live a happy life like other citizens.

The master card is linked to the unique digital identity stored on a blockchain which is also in sync with the Finnish Immigration Services. These accounts are accessible by smartphones and receive special government benefits and salary disbursements. Thus helping in bringing all the asylum seekers into the banking system. This feature has facilitated the reduction of the cybercrimes due to generation of unique digital codes, which happens to be our third objective.

This system has a wonderful feature called the CIRCLE OF TRUST , which records all the lending and borrowing of money with their friends, done through Mastercard. This helps in building up the Credit Score of the particular person. So, if he/she consistently pays back all the loans that he/she has taken from his friends, his/her credit score will go up , at the same time if he is not consistent in paying back his credit score will go down. This feature gets them in a position wherein they can borrow money from the financial institutions. So in the next few years the refugees of Finland become capable of taking loans from banks and starting their own businesses , which in turn make them capable enough to become major contributors to the economy. Thereforth, Block chain plays the major role in the inclusion of banking industry in the struggle to overcome the refugee issue, thus contributing to our fourth objective.

**SECOND CASE STUDY - "Andhra Pradesh-Land ownership ledger system"**
According to a McKinsey Global Institute report on distortion of Indian Land markets, 1.3 percent of lost GDP growth every year. To deal with such a crisis, the state government wanted to use the technology in managing land records first. Putting India's land records on blockchain would help in reducing fraud, increase efficiency and in return boost economic growth. Andhra Pradesh the first state in the country of India to introduce pilot projects for the departments of civil supplies and land records in order to protect data of subsidies and land ownership from cyber attacks. This proves to be the best example of our first objective which is to identify the country which supports block chain. The technology is used in the transport department to streamline titles of the vehicles. In collaboration with a Sweden-based startup Chroma-Way, AP government has developed a ledger system tracking digital information that will allow people to collatarize property.

Land ownership system is grappling with fraudsters and people often fear being duped with fake land certificates. The disputes over titles often end up in courts. Thus ,the state as taken an initiative to help the people by using the block chain. Hence by-forth it supports our second objective which is to see how it influences the user to be a part of a block chain. This mechanism will lessen the administrative hassle of registration and title transfer. Once the data on lands or real estate transactions are on blockchain all the parties involved can track the deal.

The technology works by creating public ledgers of all the transactions, replacing a mass of overlapping records with a simple database. The state government has so far secured more than 1,00,000 land records through Zebi Data which will authenticate the credentials of users, allow them to access the records and give them a certificate and no one can tamper with the database. The buyers, too, can access relevant information on registering with their credentials. This has facilitated to reduce the cybercrime in land record system which happens to be our third objective.

A blockchain-based digital government can protect data, streamline processes, and reduce fraud, waste, and abuse while simultaneously increasing trust and accountability. On a blockchain-based government model, individuals, businesses, and

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governments share resources over a distributed ledger secured using cryptography. This structure eliminates a single point of failure and inherently protects sensitive citizen and government data.

**THIRD CASE STUDY - "Andhra Pradesh-cryptology and security"**

India was affected by ransomware attack WannaCry last year after the key markets within the country took huge hits. AP is spearheading the revolution by embracing the technology. The state's adoption of blockchain technology will help in securing the government data. To secure the data from ransomware or cyber attacks, the state established a research and development centre for cryptocurrency in association with RC Bose Centre for Cryptology and Security at the Indian Statistical Institute. The State also plans to build the largest repository of blockchain use cases in transport, finance and digital security. This proves to be the one of the example of our first objective which is to identify the country and the state which supports block chain.

The state as taken an initiative to help the people by using the block chain as the state is training police forces on blockchain technology through workshops to prevent cybercrime. It has developed specialised centres of excellence in collaboration with Thomson Reuters, Broadridge for reducing cyber attacks and to support the technology and implementation of pilot projects to ramp up e-governance transparency in Andhra Pradesh. This consummate the second objective of the study.
Blockchain would make a huge difference in fostering secure transactions. The blockchain is the only trust protocol that guarantees the safety of all digital and financial assets. The main characteristic of the technology is the data cannot be modified after it is created as a result it can prevent and detect any form of tampering. This has facilitated to reduce the cybercrime, which happens to be our third objective.

**FOURTH CASE STUDY – "Air Asia and its blockchain technology"**

The global health crisis has had the dual effect of decimating two interlinked industries, both air travel, and global supply chain routes. During the pandemic, Restrictions imposed by governments left airlines, AirAsia inclusive, with no alternative but to temporarily suspend the flights . Faced with a bleak outlook for its passenger business, In a bold move ,renowned budget airline AIRASIA operating in India and Malaysia , deliberately launched Freight Chain during the period of uncertainty within global supply chains. Grounded for passenger flights, 287 AirAsia aircraft were repurposed to transport air cargo using Freight Chain. Freightchain leverages AirAsia's wide network in Southeast Asia, which covers over 87 cities, and has the capacity to carry over 1 billion parcels annually on over 287 AirAsia aircraft. This signifies our first objective which is to identify the country which supports block chain.

Freightchain provides freight forwarders the agility to leverage AirAsia's 287 aircraft to transport air freight, greatly simplifying the booking and itinerary-confirmation process. At a time of interrupted supply chains worldwide, the shipper can instead rely on Freight Chain to uncover all available cargo network connections operated by airlines and then facilitate bookings in real-time via bids that are verified instantly on the blockchain. The airlines can 'interline' with other carriers to expand their cargo network. The idea is to make the air cargo booking experience no longer exclusive to selected key agents and forwarders, but open to all, and should be as simple and fast as booking a flight ticket. Teleport's platform serves as a marketplace to offer open access to shippers and freight forwarders that suit the customer's budget and shipping requirements, equipped with the booking and payment process to create an end-to-end self-service platform. The automation and self-service platform will improve the operational efficiency as well as save cost for the customers as well as the airlines. Hence by-forth it supports our second objective which is to see how it influences the user to be a part of a block chain that facilitates.

The challenge is that the traditional interlining contract process is very complex and slow. Also, the contract terms and execution lack the agility and speed to adjust with the market conditions.

Freight Chain was conceived to solve this problem. By leveraging blockchain technology's noted traceability and accountability capabilities, Freightchain is reinventing the way air cargo is booked. This has also facilitated in the reduction of cybercrime, which happens to be our third objective.

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AirAsia has also revealed its plan to create its own cryptocurrency, BigCoin, which passengers will be able to use to pay for tickets and in-flight services. Their usual flyer points will be transformed into BigCoin, and the new prices will soon be revealed in this new cryptocurrency on the company's website. Of course, alongside the prices in BigCoin, passengers will be able to find the prices in other usual currencies as well. That is "world's first blockchain-based airline loyalty digital wallet", developed with KPMG and Microsoft. Their plan includes developing an app by August 2018, which will allow their customers to use a digital wallet from which they will be able to make in-flight purchases and improve their flight experience even more.

**FIFTH CASE STUDY – "Block chain and Indian banks: IBBIC - A move that could be a boon for MSMEs"**

This case study is the epitome of our fourth objective which is to discern the way the banking sector embraces the block chain technology. Indian Banks' Blockchain Infrastructure Company Private Limited (IBBIC) is a coalition of 15 banks, including ICICI Bank, HDFC Bank, RBL Bank, SBI and Canara Bank. Out of the 15 banks, eleven are privately held by investors while four are public sector units. The private banks include HDFC Bank, ICICI Bank, Kotak Mahindra Bank, Axis Bank, IndusInd Bank, Yes Bank, RBL Bank, IDFC Bank, South Indian Bank, and Federal Bank. And, the public sector units encompass Bank of Baroda, SBI, Canara Bank, and Indian Bank. American lender Standard Chartered is the only international player in the consortium. The system will be based on Infosys' Finacle Connect, a blockchain-based platform that enables digitisation and automation of trade-related finance processes.

The move is expected to eliminate paperwork, reduce transaction processing time, and offer a secure environment. Moreover, it could be a boon for medium and small-scale enterprises (MSMEs).Basic invoice can be turned into a token, which can then be used to settle payments, overheads, and other adjustments. LCs are letters from a bank that guarantee that a buyer will pay the seller on time, and for the correct amount. Using blockchain to issue LCs would potentially solve these issues. Even elemental fraud like the issuance of two LCs on a single invoice can be easily prevented with the help of this blockchain technology.

The technology is purely based on the concept of tokenization. This helps turn sensitive data into nonsensitive data that can be leveraged by multiple parties in a series. It also helps preserve the authenticity of data and indirectly enables digitisation.

Through all of its transactions, assets, liabilities, and more, tokenization would make approvals quick, disbursements and settlements would be instantaneous, and the chances of fraud are minimised. Thus this case study dwells on the fact that the banking sector is more keen in minimising the cyber crimes which satisfies our third objective.

Domestic LCs are just the tip of the iceberg. The industry has been exploring more complex use-cases such as collateralized loan disbursal, deeper credit rating, and even transaction traceability. Tokenization of assets like stocks, bonds, registration certificates, and more can make them instantly available as collateral, making deals far safer for lenders.

Thus the banking industry of India are into creating a new company that will leverage the power of blockchain technology to speed up the processing of Letters of Credit (LCs).Currently, the process of issuing an LC is relatively slow and requires human intervention to prevent frauds, authenticate transactions, and balance the ledger which are the banks has planned to digitise and automate using blockchain technology, thus making it more secure and accurate.

**Conclusion:**

Blockchains have received much interest worldwide. Blockchain usage in different areas including cryptocurrency, healthcare, advertising, insurance, copyright protection, energy, and societal applications have been promising across various countries. We have taken the case studies from different domains to show the diversity in the application of block chain. The objective of our study remained diversified in nature to reflect the implementation of blockchain in various aspects of each case study.

Thus, our study indicates that blockchain research is expanding rapidly with a distinct evolution pattern among the different layers and concepts of blockchain implementation. With potential application ranging from wider banking and business to voting and international trade, defence, blockchain could redefine many aspects of our life. Further research suggestions

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would include the economic implications and impact of such non-Bitcoin blockchain applications. Moreover, the discussion will motivate blockchain applications in more domains.

**References:**

1. SULTAN, supra note 152.KARIM SULTAN, UMAR RUHI & RUBINA LAKHANI, CONCEPTUALIZING BLOCKCHAINS: CHARACTERISTICS & APPLICATIONS 51(2018),https://arxiv.org/pdf/1806.03693.pdf. https://www.researchgate.net/publication/325464908_Conceptualizing_Blockchains_Characteristics_Applications

2. Ray King, (2019) Blockchain Explained: The Ultimate Guide to Understanding How BlockchainWorks,BITDEGREE(June21,2019),https://www.bitdegree.org/tutorials/blockchainexplained/.

3. Mike Orcutt, (2019) Once Hailed as Unhackable, Blockchains Are Now Getting Hacked, MIT TECH. REV. (Feb. 19, 2019), https://www.technologyreview.com/s/612974/once-hailed-as-unhackable-blockchains-are-now-getting-hacked/ [hereinafter Orcutt, Once Hailed].

4. Sonali D.Patil, Atul B.Kathole, Savita Kumbhare, Kapil Vhatkar, Vinod V. Kimbahune,"A Blockchain-Based Approach to Ensuring the Security of Electronic Data", International Journal ofINTELLIGENT SYSTEMS AND APPLICATIONS IN ENGINEERING, IJISAE, 2024, 12(11s), 649–655. https://ijisae.org/index.php/IJISAE/article/view/4486/3145

5. SAWTOOTH,(2016) https://sawtooth.hyperledger.org/docs/core/nightly/0-8/intrNOR. REFUGEE COUNCIL, SYRIAN REFUGEES' RIGHT TO LEGAL IDENTITY: IMPLICATIONS(2017),https://www.nrc.no/globalassets/pdf/briefing-notes/icla /final-syrian-refugees-civil-documentation-briefing-note-21-12-2016.pdf

6. CorinFaife,(2017) Bitcoin Hash Functions Explained, COINDESK, http://www.coindesk.com/bitcoin

7. Samer Aburass(2017), Syrian Refugees' Documentation Crisis, NOR. REFUGEE COUNCIL , https://www.nrc.no/news/2017/january/syrian-refugees-documentation-crisis/.

8. Atul Kathole , Dinesh Chaudhari "Secure Hybrid Approach for Sharing Data Securely in VANET", Proceeding of International Conference on Computational Science and Applications pp 217–221, © 2022 The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd

9. Justine Humenansky, (2018)The Impact of Digital Identity, BLOCKCHAIN BERKELEY , https://medium.com/blockchain-at-berkeley/the-impact-of-digital-identity-9eed5b0c3016.

10. Helen Zhao,(2018) Bitcoin and Blockchain Consume an Exorbitant Amount of Energy. These Engineers Are Trying to Change That, CNBC (Feb. 23, 2018), https://www.cnbc.com/201802/23/bitcoin-blockchain-consumes-a-lot-of-energy-engineers-changing-that.html.

11. Res.(2019), Transforming Our World: The 2030 Agenda for Sustainable Development, Alliance, ID2020, https://id2020.org/alliance

12. Rohan Pinto, (2018)How Blockchain Can Solve Identity Management Problems, FORBES,https://www.forbes.com/sites/forbestechcouncil/2018/07/27/how-blockchain-can-solve-identity-management-problems/#531659f913f5.

13. SURVEILLANCE SELF-DEF. (May 9, 2018), A Deep Dive on End-to-End Encryption: How Do Public Key Encryption Systems Work? https://ssd.eff.org/en/module/deep-diveend-end-encryption-how-do-public-key-encryption-systems-work [hereinafter A Deep Dive].
14. BLOCK CHAIN REFUGEE-MONI file:///C:/Users/hemam/Downloads/22261-finding-refuge-blockchain-technology-as-the-solution-to-the-syrian-identification-crisis.pdf

15. Chandramouli Shivaratri, Prakash, Arun, Krishna Mayi, Kavitha, Sivaperumal (2023), Clothing Products Purchases through Social Media Advertisements and the Problems Involved, Remittances Review, Vol. 8, Issue 4, Pp. 3260-3268.

16. Akkur, S. A., R, R., S, S., P, D. K., Miryala, R. K., & Arun, R. (2023). Leadership Qualities Among Women Leaders in Educational Institutions at Bangalore City. International Journal of Professional Business Review, 8(9), e03772. https://doi.org/10.26668/businessreview/2023.v8i9.3772

17. Block chain and humanitarian settings- https://www.igi-global.com/chapter/refugees-and-humanitarian-settings/268650

18. How Blockchain Can Transform the Financial Services Industry Aashima, Birajit Mohanty,Book Editor(s):Kiran Sood, Rajesh Kumar Dhanaraj, Balamurugan Balusamy,SeifedineKadryhttps://onlinelibrary.wiley.com/doi/abs/10.1002/9781119865247.ch12

19. A. B. Kathole, K. N. Vhatkar, and S. D. Patil, "IoT-Enabled Pest Identification and Classification with New Meta-Heuristic-Based Deep Learning Framework," Cybernetics and Systems, vol. 0, no. 0, 2022, doi: 10.1080/01969722.2022.2122001.

20. Falwadiya, Himanshu & Dhingra, Sanjay & Gupta, Shelly. (2022). Blockchain in banking and financial services.10.1201/9781003282914-3. https://www.taylorfrancis.com/chapters/edit/10.1201/9781003282914-3/blockchain-banking-financial-services-himanshu-falwadiya-sanjay-dhingra-shelly-gupta?context=ubx

21. Singh, P. (2020). Role of Blockchain Technology in Digitization of Land Records in Indian Scenario. IOP Conference Series: Earth and Environmental Science. 614. 012055. 10.1088/1755-1315/614/1/012055. https://www.researchgate.net/publication/347929403_Role_of_Blockchain_Technology_in_Digitization_of_Land_Records_in_Indian_Scenario

22. Prakash, N. & Manyam, Kethan. (2018). Effectiveness and Efficiency of e-Governance in Andhra Pradesh. International Journal of Advanced Scientific Research & Development (IJASRD). 5. 01. 10.26836/ijasrd/2018/v5/i1/50103. (PDF) Effectiveness and Efficiency of e-Governance in Andhra Pradesh (researchgate.net)

23. Atul Kathole , Dinesh Chaudhari "Securing the Adhoc Network Data Using Hybrid Malicious Node Detection Approach", Proceedings of the International Conference on Intelligent Vision and Computing (ICIVC 2021) pp 447–457 © 2022 The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd.

24. Buying behavior of meet's consumption relates to food safety from north and south part of the Coimbatore City. International Journal of Recent Technology and Engineering, 7, 429-433. https://www.ijrte.org/wp-content/uploads/papers/v7i5s/ES2177017519.pdf

25. P, S., Prakash, K. C., Arun, R., C, N., Kousalya, M., & Sivaperumal, K. (2023). Green HRM Practices and the Factors Forcing it: A Study on Health Care Entities in Chennai. International Journal of Professional Business Review, 8(9), e03773.K. C. Prakash, R. Arun, Ram Chandra Kalluri, Souvik Banerjee, M R Vanithamani, Biswo Ranjan

26. Mishra(2023), Consumer Confidence Index and Economic Growth- Indian Context after the Covid-19, European Economic Letters, Pp 746-754, DOI: https://doi.org/10.52783/eel.v13i5.824

27. Arumugam, T., Arun, R., Natarajan, S., Thoti, K. K., Shanthi, P., & Kommuri, U. K. (2024). Unlocking the Power of Artificial Intelligence and Machine Learning in Transforming Marketing as We Know It. In S. Singh, S. Rajest, S. Hadoussa, A. Obaid, & R. Regin (Eds.), Data-Driven Intelligent Business Sustainability (pp. 60-74).

28. Poleshkina, Irina. (2021). Blockchain in air cargo: challenges of new World. MATEC Web of Conferences. 341. 00021. 10.1051/matecconf/202134100021. (PDF) Blockchain in air cargo: challenges of new World (researchgate.net)

29. K. N. Vhatkar and G. P. Bhole, "A comprehensive survey on container resource allocation approaches in cloud computing: State-of-the-art and research challenges," Web Intelligence, vol. 19, no. 4, pp. 295–316, 2021, doi: 10.3233/WEB-210474.

30. Blockchain technology: implications for operations and supply chain management Rosanna Cole, Mark Stevenson, James Aitken Supply Chain Management ISSN: 1359-8546Cole, R., Stevenson, M., & Aitken, J. (2019). Blockchain technology: Implications for operations and supply chain management. Supply Chain Management: An International Journal, 24(4), 469–483. https://doi.org/10.1108/SCM-09-2018-0309.

31. K. Netaji Vhatkar and G. P. Bhole, "Self-improved moth flame for optimal container resource allocation in cloud," Concurrency and Computation: Practice and Experience, vol. 34, no. 23, Oct. 2022, doi: 10.1002/cpe.7200.

32. 2021, pp.37-45 BLOCKCHAIN TECHNOLOGY AND ITS ACCEPTABILITY IN BANKING INDUSTRY IN INDIA International Journal of Education, Modern Management, Applied Science & Social Science (IJEMMASSS) 37 ISSN : 2581-9925, Impact Factor: 6.340, Volume 03, No. 04(II), October - December,

33. TRAJECTORY OF BLOCKCHAIN TECHNOLOGY IN INDIA: FROM USE CASES TO DATA PROTECTION REGIME https://ssrn.com/abstract=4200987