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Seminar Report on

ANALYSIS OF BLOCKCHAIN IN INDIA

Submitted by

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CERTIFICATE

Certifies that the seminar entitled **"Analysis of blockchain in India"** is a work carried out by **PRIYA DUTT M D** bearing **4NI15IS084** in partial fulfilment for the seminar prescribed by The National Institute of Engineering, sixth semester B.E, Information Science and Engineering. It is certified that all correction, suggestions indicated for internal assessment have been incorporated. The seminar report has been approved as it satisfies the academic requirements in respect to the seminar work prescribed for sixth semester.

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ABSTRACT

The new field of cryptographic currencies and consensus ledgers, commonly referred to as *Blockchains*, is receiving increasing interest in different fields globally. The fields include: Technical enthusiasts, activist groups, researchers from various disciplines, start-ups, large enterprises, public authorities, banks, financial regulators, businessmen, investors and also criminals. With its unique nature, blockchain technology is used in most of the country today and its usage as bitcoin is rapidly increasing since its advantageous over banks and other transaction medium.

With the idea of blockchain as a disruptive technology gaining ground, each country is looking to chart its own path based on both global learning and domestic ground reality. India is no exception. The objective of this report is to answer the questions like, what are blockchain and the application of it in crypto-currencies, introduction to bitcoins, and its mechanism, purpose and benefits. current status and scope for blockchain technology in India, start-ups emerging using blockchain , various companies that support blockchain technology, its risks and benefits, an in-depth analysis of how blockchain is unfolding in India and future of blockchain in India. This also deals with the various crypto currencies that are coming into picture in India and the government rules and regulations towards this new technology.

<u>ACKNOWLEDGEMENT</u>

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Chapter 1:

<u>INTRODUCTION</u>

Block chain is an ingenious invention by a person known by the pseudonym, Satoshi Nakamoto. Since then, it has evolved into something astonishing and   the main question everyone is asking is: What is Blockchain? Blockchain technology created the backbone of a new type of internet, by allowing digital information to be distributed but not copied. Originally devised for the digital currency Bitcoin, the tech community is now finding other potential uses of this technology.

Blockchain is the latest innovations in the digital technology & is on its way to create a revolution in the digital economy called cryptocurrency. It is growing list of "*blocks*", which are records that are linked to each other and secured using cryptography. Blockchain use very advanced algorithms which greatly reduces the dependency on people to verify all sorts of transactions. This is the technology behind BITCOIN. Blockchain is defined as an online ledger which makes use of data structure and thereby simplifies the transaction. Also, it uses more secured networking system that protects the identity of its users & thus making the transactions highly secured. Having a basic knowledge of these new advanced technology shows why it's considered revolutionary.

Today almost every company is working hard to explore the various capabilities this technology have. In developing country like India, adoption of the new technology is challenging and requires lot of efforts to implement. The developers are trying hard to explore and get benefitted by the implementation of blockchain. Here we discuss various applications of blockchain technology worldwide and India's response to this new advanced technology.

Chapter 2:

<u>MECHANISM OF BLOCKCHAIN</u>

<u>2.1. History and development of blockchain:</u>

During the great financial crisis in 2007-2008, one of the largest investment banks, Lehman Brothers broke down. Other leading banks were set follow; people were clear that even after paying the fees and service charges, their money is neither safe nor guaranteed. During this time, a perfect platform was set for developers to come up with an alternative solution where nobody would control the data flow! And, *Satoshi Nakamoto came forward with the peer-to-peer electronic networking transfer system that cemented two disruptive ideas.*

1. Blockchain: A distributed online ledger practice
2. The Internet of money based on distributed ledger.

His goal was, to invent something great, where many people failed to create before. The most important work of Satoshi's invention was that he found a way to build a decentralized digital cash system. In the 90's, there were many attempts to create digital cash but all were vain. Satoshi saw all the centralized systems failed, so he tried to build digital cash system without a central entity using peer-to-peer network for file sharing. This was the birth of crypto currency.

"The blockchain is an incorruptible digital ledger of economic transactions that can be programmed to record not just financial transactions but virtually everything of value."

<u>2.2. Objective of blockchain technology:</u>

Blockchain was implemented in 2009 as a core component of bitcoin which serves as the public ledger for all transactions. The invention of the blockchain for bitcoin made it the first digital currency to solve problem which was there with centralised banks such as:

- High transactions rates
- Centralised power
- Double spending
- Prone to hacks
- Private ledgers

The bitcoins resolved all these issues, without the need of a trusted authority or central server. The bitcoin design has been an inspiration for other applications. Blockchain holds the information as a shared and continually reconciled database. The blockchain database is not stored in single location; the records are easily verifiable and truly

public. *No centralized version* of this information exists for a hacker to corrupt. The data is accessible to anyone on the internet, since it is hosted by millions of computers simultaneously. By storing blocks of information which are identical across its network, the blockchain,

1. Cannot be controlled by any single entity.
2. It has no single point of failure.
3. The block chain network lives in a state of consensus, one that automatically checks in with itself every ten minutes. A kind of self-auditing ecosystem of a digital value, the network reconciles every transaction that happens in ten-minute intervals. Each group of these transactions is referred to as a "block". Two important properties result from this:
4. **Transparency** data is embedded within the network as a whole, by definition it is public.
5. **It cannot be corrupted** altering any unit of information on the blockchain would mean using a huge amount of computing power to override the entire network.

2.3. How does blockchain work?

Bitcoins are the first decentralised digital currency. Since it is digital and decentralised you can't create bitcoins as per our needs because, these uses various cryptography and mathematical problems to control its creation and management. There are only 21 million bitcoins that can be created, as of now 15 million is already created. The bitcoin communities keep on upgrading the algorithms and cryptographic technology so that even more minors increase bitcoin won't get exhausted. It is estimated that the last bitcoin will be used in 2140. These are held electronically in a peer to peer open ledger called the blockchain.

A block is the 'current' part of a blockchain which records some or all the recent transactions, and once completed goes into the blockchain as permanent database. Each time a block gets completed, a new block is generated. In a blockchain, there are three key concepts. First is the previous block hash code. Every block has a specific hash code associated with it, which is the identifying factor for that block. This hash is created by complex hashing algorithm that the minute change in the input will create a highly different output as whole. It's impossible to alter this code. Secondly, every validate and complete hash transactions (multiple) details is added to the block thereby ensuring by from any manipulation. Thirdly, the value or proof of the work for a block. This is basically a mathematical solution that is attached to a block to ensure the validity of block.

The ledger has access to everyone and it is not easy to modify it. Ledgers are produced by people using software that solves mathematical problems. Even if we try to modify, fake a ledger it is not accepted. The ledger itself get distributed in the network, everyone has a copy of it, hence it's not valid if a ledger is modified, its gets rejected and cannot become the part of blockchain. Every transaction holds details of the transfer of currency from one account to the another. The balance of any account is not stored explicitly. It is always calculated by adding up all the blockchain ledgers ever recorded. *Miners,* verify the details of the sender and ensure secure and valid transaction. The miners who verify and add that to block get 12.5 bitcoins as incentive for a creation of a new block.

Chapter 3:

<u>APPLICATIONS OF BLOCKCHAIN</u>

As it turns out, blockchain can be used applied in various ways other than crypto currency. Here are some blockchain ideas that are in progress stage.

3.1. Applications of blockchain that shaping our future:

3.1.1. Blockchain in Financial Services:
1. *Asset management, Trade processing and settlemen*t: Traditional trade processes under asset management is risky and expensive. The parties in the process, such as broker, custodian, or the settlement manager, maintain their own records which is inefficient and miscalculation. The blockchain ledger reduces error by encrypting the records and simplifies the process, by cancelling the requirement of intermediaries.

*2. Insurance: claims processing***:** Insurance processors have to pitch in through duplicitous and fraudulent claims, fragmented data sources, or abandoned policies for users etc which process these forms manually which causes huge errors. The blockchain provides a risk-free management and transparency by its encryption properties which allow insurers to have full access and provide ownership.

3.1.2. Blockchain Smart Property*:*
*1.Unconventional money lenders/hard money lending***:** Traditional lending system can be revolutionize by smart contracts. People with poor credit with much needed loans, approach unconventional money lenders service, while they charge 2-10% of the loan amount and claiming their property as collateral. Because of this borrowers fall into bankruptcy and lose homes. The blockchain cut down all this by encoding the property on the blockchain for all to see.

*2. Your car/ smartphone***:** The problem with primitive forms of smart property is that the key is usually held in a physical container, such as the car key or SIM card, and can't be easily transferred or copied. The blockchain ledger solves this problem by allowing blockchain miners to replace and replicate a lost protocol.

3.1.3. Blockchain Internet-of-things (IoT):

1.Smart Appliances: A smart appliance is a device that connects to the internet which provides high quality data and control than before. For example, a code connected to your appliance can be linked to the internet and alert whenever it is ready or stopped which helps to keep the devices in good condition. Encrypting these appliances on the blockchain protects the ownership and enables transferability.

*2. Supply Chains***:** Companies are given with sensors for end-to-end visibility of their supply chain by providing data on the location and condition of the supplies as they are transported around the globe. The blockchain stores, manages, protects and transfers this smart information.

3.1.4. Blockchain in smart contracts:

*1.Blockchain Healthcare***:** Personal health records could be encoded and stored on the blockchain with a private key which would provide access only to specific individuals. In the research conducted via HIPAA law, receipts of surgeries could be stored on a blockchain and automatically sent to insurance providers as proof-of-delivery. The ledger could be used for general health care management, such as supervising drugs, regulation compliance, testing results, and managing healthcare supplies.

2. Blockchain Music: Music industry has key problems like ownership rights, royalty distribution, and transparency. The digital music industry focuses on monetizing productions, while ownership rights are often overlooked. The blockchain and smart contracts technology can circuit this problem by creating a comprehensive and accurate decentralized database of music rights.

3.1.5. Blockchain Government:

*1. Passport***:** The passport is stored on the ledger, given a Bitcoin address with a public IP, and confirmed by Blockchain users.

2. Birth, death and wedding certificates: The blockchain could make record-keeping more reliable by encrypting birth and death certification and empowering citizens to access this crucial information.

*3. Personal Identification***:** Blockchain ID is a digital form of ID that's engineered to replace all these forms of physical identification like driver's license, computer password, identity cards, keys, social security ID, and so forth.

It's important to note that for the blockchain to work; the node-to-node network must be motivated and agree to work under ethical standards. Once, and only if, these standards are adhered to, the blockchain could become a powerful tool for improving business, conducting fair trade, democratizing the global economy, and helping support more open and fair societies.

Blockchain today may be compared to what the Internet was in the early 1990s. While we have witnessed how the 'Internet of Information' has changed our society over the past two decades, we are now entering a phase where Blockchain may do the same by ushering in a new paradigm comprising 'Internet of Trust' and 'Internet of Value'. The financial services industry may be one of the firsts to be impacted by wider adoption of Blockchain and its associated Distributed Ledger Technologies. The extent of this impact is contingent on how nimbly the industry players capitalize on this technology and the nature of support it garners from wider stakeholders.

Chapter 4:

<u>ANALYSIS OF BLOCKCHAIN IN INDIA</u>

With the idea of blockchain as a disruptive technology gaining ground, each country is looking to chart its own path—based on both global learning and domestic ground reality. India is no exception. India has a number of unique factors that will influence they are already doing how blockchain gets deployed. Broadly, they can be divided into three buckets:

4.1. Macro-economic Factors:

There are various macro-economic factors that potentially influence how a new high impact technology gets deployed in an economy. In case of India, the first and foremost factor that pulls everyone here is the sheer size of the market. Even in times when ease of doing business was tough, this factor alone attracted scores of business to India.

BLOCKCHAIN TRIALS IN INDIA

Time	Trial Owner	Type Of Entity	Other Partners	Platform	Implementation Partners	Use Case
October 2016	ICICI Bank	Commercial Bank	Emirates NBD	EdgeVerve Blockchain Framework	EdgeVerve Systems (Infosys)	Trade Finance, Cross-border Remittance
October 2016	Kotak Mahindra Bank	Commercial Bank	-	-	-	Trade Finance, Cross-border Remittance
November 2016	Mahindra & Mahindra	Non-bank financial co	NA	Hyperledger Fabric	IBM	Trade Finance
January 2017	Yes Bank	Commercial Bank	Bajaj Electricals	Hyperledger Fabric	Cateina Techologies, IBM	Trade Fiance
January 2017	IDRBT	Regulator promoted research/ Academic institution	SBI, PNB, HDFC, Citibank, Deutsche Bank (Commercial banks), NPCI (Payment Co)	Hyperledger Fabric	MonetaGo	Trade Finance
January 2017	Axis Bank	Commercial Bank	NA	Ripple	-	Cross-border Remittance

Secondly, India still stands as a hope in the developing stage in global economic environment, with growth predicted to be close to 88% in the next couple of years. This may impact certain technologies in both positive ways, as there will be a lot of new ideas and new investment, and negative ways, since in a high-growth environment, thrust on efficiency takes a backseat. However, Indian businesses have learnt from their past experience and everybody is now looking for a profitable and sustainable growth.

Another extremely important reason, as pointed out by Jesse Chenard, co-founder and CEO of MonetaGo, the fintech firm that was associated in the trial conducted by IDRBT, is India's diversity and challenges associated therewith. India has the fifth-highest number of billionaires in the world as well as the highest number of people below poverty line. "The idea is, if you are successful in India, you can virtually do it anywhere," says Chenard.

India is also the world's top remittance receiving country. According to the recently published Infosys research, global financial services organizations have identified cross-border payment as the top priority use case of blockchain. No country will gain as much from a more efficient execution of cross-border payments as India will.

India's large unbanked population and the recent government thrust to bring them to the financial system is another factor that would force financial institutions and the central bank to look at any efficiency enhancing technology that can effectively address the challenge. Blockchain, which is being tested for digital identity management purpose by many banks around the globe can be a potential winner. And finally, there is the overall thrust on digital in general and digital payments in particular by the current regime in Delhi. The prime minister's thrust on digital

governance and efficiency will surely be a catalyst for most disruptive technologies that are secure and reliable.

4.2. Industry/Market related factors:

In World Economic Forum's Global Competitiveness Ranking, India always scores better, often ranking ahead of many developed economies. New private Indian banks have been known to be early movers when it comes to leveraging technology in general and Internet in particular.

Indian central bank, Reserve Bank of India, is another major factor in any new technology adoption in Indian banking sector. Institute of Development and Research in Banking Technology (IDRBT) keeps studying the opportunities and challenges in new technology areas. Both these units have been actively involved in testing out blockchain as a proof of concept.

However, despite all the proactive stance of the regulator and a few banks, Indian banking sector has not been able to cut cost of banking services drastically. The cost structure in the banking system was still "significantly high" despite use of all the information technology. It is only possible by reducing the cost of transactions. Blockchain comes as a perfect godsend to achieve this objective.

4.3. Tech/Supply Ecosystem:

The third important aspect and India's position is quite unique here, is the fact that India is a tech-hub. Apart from being a large technology outsourcing destination, India is also the home to vendors with large core banking market share globally. Two of the top three core banking solution vendors, Infosys and TCS are headquartered in India.

India is today a vibrant powerhouse of fintech. This confirms the trend impact blockchain trials, rollout and deployment in a unique manner in India, making it a global learning tested.

4.4. Pocket Learning:

With stakes high and with a supportive regulatory regime and technology ecosystem, it is natural that Indian companies have decided to take a dive. Half a dozen organizations have successfully completed proofs-of-concept; many more have initiated the efforts. In the last six months and that is when the action started most of the new private sector banks has initiated blockchain PoCs.

In October 2016, **ICICI** Bank announces successful completion of pilot transactions via its blockchain network with Emirates NBD on a custom-made blockchain application, co-created with EdgeVerve Systems, a wholly owned subsidiary of

Infosys. One transaction was executed to showcase confirmation of import of shredded steel melting scrap by a Mumbai-based export-import firm from a Dubai-based supplier. The other one on the blockchain application was a transaction that enabled an ICICI Bank branch in Mumbai to remit funds to an Emirates NBD branch in Dubai in real time.   The blockchain-based smart contract has been written by fintech start-up Cateina Technologies and leverages IBM Watson Conversation, a cloud-based cognitive service and is built on Hyper ledger Fabric supported by IBM.

Axis Bank, India's third largest private sector bank, also announced a trial using an alternate blockchain technology, Ripple. It is testing the PoC to try out cross border payments.

Kotak Mahindra Bank too initiated a blockchain pilot, for transactions in cross-border remittances and trade settlements. That means there's news from all four of the top private banks in India about blockchain trials.

Chapter 5:

INDIAN GOVERNMENT ON BLOCKCHAIN TECHNOLOGY

The Indian government is launching its first official blockchain project with digital certificates of academic degrees. As per reports, the government is aiming to issue tamper-proof degree certificates, starting with students graduating next year. Indian government is also planning to integrate blockchain in the case of land titles.

The initiative, according to sources close to the development, is based on a blockchain solution called India Chain that government-run think tank NITI Aayog is currently working on. Once developed, the technology will be trailed with the **Indian Institute of Technology (IIT) Bombay as well as various colleges under the Delhi University**, with the Aayog overseeing the implementation. Commenting on the development, a source said on condition of anonymity, "The pilot trials will begin soon and once that is successfully completed, the full-scale implementation will start. The plan is to start issuing digital certificates on the blockchain (IndiaChain) from the 2019 batch onwards."
Although the government announced its intentions to curtail the use of crypto currencies for financing illegitimate activities in the **Union Budget 2018,** government is actively promoting blockchain technology, its use in other fields such as payment services, agriculture, financial exchanges, infrastructure and education. During this year's Budget session, **Finance Minister Arun Jaitley** said that the integration of blockchain in governance could result in quicker operational response as well as decision making.

To facilitate the adoption of blockchain in governance, NITI Aayog had conducted an international hackathon at IIT Delhi in November last year on blockchain, in which working prototypes were solicited from premier international and national institutes on social applications of blockchain.

The objective of the event was to explore how blockchain architectures can enable a new digital infrastructure for India, improving efficiency, transparency, privacy, and cost across all sectors.

In this regard, partner organisations from the private sector as well as state/UT governments are being identified to implement proof-of-concepts utilising the technology in different sectors. Several state governments, including **Karnataka, Gujarat, and Maharashtra**, have started evaluating the technology for purposes of e-governance backed by the state government, a 'Blockchain Hackathon for Governance' was held at the Koramangala Indoor Stadium to create demonstrable prototypes utilising blockchain in government applications.

For blockchain-based banking solutions, **SBI** had earlier formed a banking community called **BankChain** to explore and implement blockchain platform. BankChain is a community of 27 banks from India and the Middle East. **ICICI Bank, Kotak Bank, DCB Bank and Axis Bank** are also part of this community. BankChain aims to reduce fraud and maximise efficiency, security and transparency in the banking system. The community has also collaborated with Pune-based **Primechain Technologies**.

Recently, in the first week of January, more than a dozen insurers including **HDFC Life, India First Life** and **Canara HSBC OBC** joined hands to start another blockchain project to help rein in costs for companies running medical tests and evaluations.

Chapter 6:

<u>ESTABLISHMENT OF BLOCKCHAIN:</u>

6.1. Blockchain council:

<u>InQ signs MoU with Indian Blockchain Council:</u> InQ Innovation, a one-stop global innovation eco-system involving incubators and co-working spaces for start-ups, which recently opened a new office in Kochi with world-class co-working spaces, has signed an MoU with New Delhi-based *Indian Blockchain Council (IBC)* which is the thought leader for all-Blockchain related initiatives and interests in India, to set up *Indian Blockchain Council Academy in Kerala.*

InQ intends to work with Indian Blockchain Council as its strategic partner for starting and running InQ Indian Blockchain Council Academy by having training programmes, creating PoCs, setting up a full-fledged Blockchain lab, etc.

Mahindra & Mahindra, which has a presence in automotive, finance and IT sectors, could soon be known as one of the largest Blockchain players in the world. M&M announced that it was working with **IBM** to cut down the time it takes for invoice discounting for Mahindra Finance. The company now wants Blockchain to be used for different purposes across the group and wants to engage not just IBM but also start-ups from across the world. Tech Mahindra is also working on Blockchain

Blockchain training in Hyderabad:

Open Source Technologies started offering advanced training curriculum & imparting complete strategy oriented training on blockchain. Its job oriented and aspirants get to learn various in-depth primary modules of Blockchain which mainly include impart knowledge in Cryptocurrency and Smart contracts. Explaining complete basic level and advanced concepts of Blockchain technology. Core Layers of Blockchain and various mechanism concepts of Bitcoin.

6.2. Blockchain based startups in India

The startups started were mainly based on bitcoin wallet. **Unocoin, Zebpay, BuySellBitcoin** etc.

Auxesis is first blockchain development and consulting company started in Nov 2014 in India. Auxesis began to drive blockchain innovation in India, and capitalize the opportunities available in USA and Europe. In 2017, Auxesis has planned to focus on the Indian market and utilize its International experience and competency in the blockchain.

Indicoin: It is the only indigenous cryptocurrency in India. Indicoin (**India's Own Cryptocurrency**) has been developed on the Ethereum blockchain.

Block Armour, an Indian start up, is working on a next-gen enterprise Cyber security solution that leverages Blockchain Technology to secure critical enterprise systems and IoT communication. Armour delivers a Blockchain Defined Perimeter (BDP) - an enhanced Software-Defined Perimeter - rendering critical systems / cloud servers invisible.

Community Tech Labs: This empowers blockchain based projects in India. Founded in 2017, they have few running projects Indicoin, Coinwolf and Crypto Traders India and many more across the country.

Drivezy, **Zebpay**, **Hashcove**, **Unocoin**, **Prime Chain**, **Coinwolf**, **Coinsecure**, **Panacea Infotech Pvt Ltd, VerifyD.org** are the few start-ups established in India which are working on Blockchain. **JIOCOIN:** With Mukesh Ambani-led Reliance Jio reportedly planning a move to launch its own cryptocurrency using Blockchain

<u>CONCLUSION</u>

No doubt, blockchain technology is a boon. In this chaotic world, technology like this reduces the illegal interference of humans in the organised systems. Today many organisations and nations are trying to bring the best of this invention. So many developers are inventing new ways to utilize the immense advantage of this blockchain technology. The decentralised property of this technology makes it more powerful and demanding.

By few years from now on, India will have its own identity in the field of blockchain. Though it isn't supporting the crypto currency as a legal way of transaction, the other applications are being researched. Most of the multinational companies are adopting and providing wide opportunities for the development of blockchain since it's the best way to secure the information and data of the companies without any fear of external leakage of data or by hacking.

Government of India is funding for the development and Indian Blockchain council is in its research. Indian Prime Minister Narendra Modi recently hailed blockchain's transformative potential and emphasized the need for "rapid adaptation," a rare instance of a head of state publicly praising the technology. Today all over the world are using blockchain technology in various ways. And in near future this technology will stand one of the finest creation human innovations which are much needed in present scenario.

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