

Blockchain Technology: Disrupting The Current Business and Governance Model



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Abstract: *Blockchain is one of the most splendid technologies in today's industrial sector which is going to disrupt various sectors and the way the process, product and services have been done today. Both government, corporate and institutions started exploring the opportunities in blockchain technology which paves a fresh route for beneficial growth and development in this industry. The strategy taken by Indian Government on the development and application of Blockchain started with the 'Indiachain' – colossal blockchain pilot project of NITI Aayog through which government is going to use blockchain for land records, identity management, supply chain management, benefit distribution, power distribution, educational certificates, and cross border finance. It will help all stakeholders enormously in terms of enforcing contracts quickly and prevent fraud and efficient disbursement of subsidies. Further through regulatory sandbox it will test the work possibilities and facilities in blockchain through pilot project. New kind of business model and process will be implemented with the use of blockchain technology. This paper reviews the concept of Blockchain and analyse the available and prospective Blockchain technology use cases and its application at global level, technology providers and stakeholders. This paper covers the adoption policy framework of India, current development and application of Blockchain technology in various sectors of business in India and highlights the changing business model for its adoption.*

Keywords: *Blockchain Technology, Regulatory Sandbox, Changing Business Model, Supply Chain, Financial technology.*

I. INTRODUCTION

Over the past two decades, economic growth has shown increasing and critical reliance on technology. All categories of firms reinvent themselves to fit into the changing global market. It is now imperative to adopt technology with global perspective into their business model to bring innovation differentiation, transform their business to new market and optimize the resources. Verint Survey Report (2018) revealed that the global customer retention across all the sectors has been declined from 61% to 51% and the organisations are in a position to work hard to add new customer and retain the existing customer by connecting them digitally. Adopting digital technology to reach the customer with human touch is the expectation of the customer which in turn creates

customer engagement. McKinsey Report (2019) highlighted that India's digital adoption is faster and uneven among the sectors. Digitalization in sectors like retail, logistics, education, energy, agriculture and financial services will create additional economic value of \$150 billion in 2025 and improve equivalent of demand and supply, reduce cost, fraud and time. In response to this changes all stakeholders in this eco system need to anticipate this technology forces which will disrupt their business, as a workers and consumers. Industry 4.0 fostered the digitalization and integration of horizontal and vertical value chains across various sectors with digital technology and transforming the business. One of the new technologies which are going to disrupt the existing business is Block chain technology. Even though the Blockchain technology development and adoption is at slower pace many companies and government want to explore and exploit the opportunities by early adoption. This paper mainly focuses on the application of Blockchain at global level and India's adoption policy and its status by collecting reviewing the existing research work and reports.

This paper structured into two sections; first section covers the concept of blockchain technology, its application at global level and second section analyse the India's adoption policy and status, and its implication on business.

II. WHAT IS BLOCKCHAIN?

A distributed ledger technology Blockchain was initially developed as a monitoring database for Bitcoin transactions. It was created in 2009 by Satoshi Nakamoto to allow people and organisations, using complicated algorithms and consensus to check and process transactions without the need for a trusted third party intermediary. It is designed to maintain track of every information in the transaction that occurs in the network. Each distinct customer is a network node and a copy of the ledger is maintained. The customers involved in the scheme verify each transaction on the blockchain database by themselves and eliminates the trusted third-party verification. Their objective is to leverage the distributed ledger of blockchain and create a decentralized trust system with less transaction fee and less processing time (Deloitte Report 2016).

A Blockchain is a digital, immutable, distributed ledger that relies on cryptology and data security which records transaction chronologically in near real time. The subsequent transaction is added to the ledger only after getting the respective consensus of the network participants (nodes). This creates an endless control mechanism for errors, manipulation and data quality. Simply putting Blockchain is a protocol for exchanging value over the internet without an intermediary.

Manuscript published on 30 September 2019

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It heavily relies on fundamental tools from Cryptology and Data Security, especially in terms of message authentication targeted towards tamper-evidence and tamper-resilience. Blockchain has drawn wide interest from different communities, companies, industrial sectors and governments. MIBrand Magazine (2018), article mentioned the expected development in blockchain technology in three phases Digital Currency – blockchain 1.0, Digital Finance – blockchain 2.0 and Digital Society – blockchain 3.0. In the disruptive technology era it is extremely necessary to redefine the existing business models and archetypes as a whole.

A. Application of Blockchain

Abhimanyu Krishnan (2018) article outlined the application of Blockchain at global level in a diverse field such as financial services, Healthcare, Music, Logistics and Energy due to its innate flexibility of blockchain. The main specialty of the blockchain platform is its capability to build and apply distributed ledger concept to numerous industries and disrupt the existing business model and create an innovative services and solution to the societal issues into business. Table 1 display the innovative business and service developed with the application of blockchain technology. The major gain of blockchain technology to business is the efficient use of resources and transparency in transaction and possibility of directly connecting with the parties of the transaction and eliminates fraud and possibility of gaining from information asymmetry.

Zhang et.al (2017) reviewed the existing Peer-to-Peer energy trading project and stated TransActive Grid created a community market for buying and selling energy securely and automatically by using ethereum blockchain smart contract. Electron a blockchain technology platform which simplifies the metering and billing system in energy markets. Their research found that the blockchain is the very promising technology for P2P energy trading market. Monegraph Inc (2014) blockchain enables sharing of revenue for sharing images, video clips, internet broadcast across the value chain. Oracle associated with the World Bee Project will use blockchain hyper ledger fabric to ensure honey is being produced from sustainable source through Bee Mark Label. Its Hive Network remotely collects data by using IoT sensors about interconnected beehives. The collected data will be stored and shared across the network and buyer can validate the source (Rachel Wolfson 2019). KodakOne platform a blockchain-based image rights management platform enable the registered photographers to sell and acquire image license and use KODAKCo in crypto currency for payment (Kodak et al.2018).

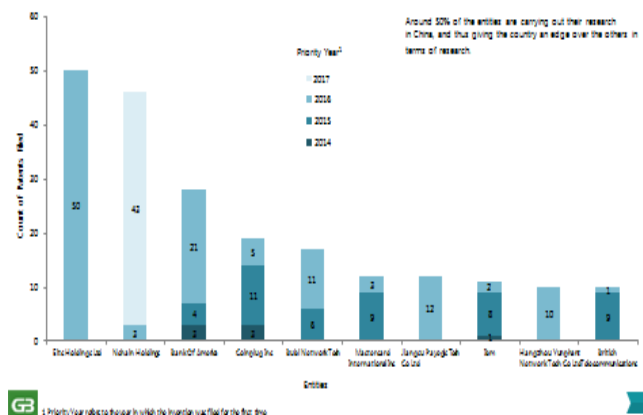
The Cognizant Report (2017) highlighted that the European based consortium of insurer B3i soon going to launch B3i Cat XoL a blockchain to explore the opportunities and accelerate the process across the insurance value chain. Jaag et al. (2016) explored the application of blockchains in supply chain management, identity services and device management. PayPie (2017) provide blockchain based risk assessment tool which collect real time financial data and provide a unique risk-score. Their transparent and trusted tools enable financing opportunities for other participants within the PayPie eco-system and lend money against invoiced

receivables.

Organisations in Europe and USA are investing their resources into the Blockchain research and flood of startups companies and government efforts going to revolutionize. The reports of Greby (2017) shows that the nine European banks joined to build we-trade.com a platform built on Hyperledger Fabric blockchain which simplifies the cross border money exchange by innovative Smart Contract. Banks also started blockchain initiatives individually ING Bank innovation teams completed the pilot work on 27 proofs of concept in six areas: payments, lending, bank treasury, financial markets, trade finance, compliance and identity, and working capital solutions (Richard Kastelein 2017).

Coca-Cola and US State Department collaborated with Blockchain Trust Accelerator, the Bitfury Group, and Emercoin launched a program with the use of blockchain distributed ledger to create a worker registry and prevent human trafficking, child labour, forced labour, and bring more transparency to the labour policies and land rights across their supply chain by 2020 (Greby Reports 2017). Figure 1 highlighted the no of patents related to blockchain owned by corporate at global level. Bank of America holds number one bank in blockchain patent and it focus on using Blockchain for recording, verifying transactions and peer-to-peer payment system to ease foreign transfers.

Figure 1- Top entities based on number of patents owned



Source: greyb.com

Gerard Sylvester (2019) report stated that the application of Blockchain in agriculture is numerous and lot of application is created and pilot tested in developing countries. ripe.io, agridigital.io, theseam.com are few blockchain based platform which helps in commodity management, supply chain finance, and bring traceability to agribusinesses. Barilla an Italian pasta and pesto sauce manufacture implemented QR code to trace the pesto production phase from cultivation, treatment and harvesting in the field to transportation, storage, quality control to production with the use of blockchain. This provides transparency and increase trust and rewards the best practicing agriculture producers. Development in blockchain technology will connect the untapped and unconnected people to the distributed network and opportunity to create more sustainable, transparent and efficient governance and business.

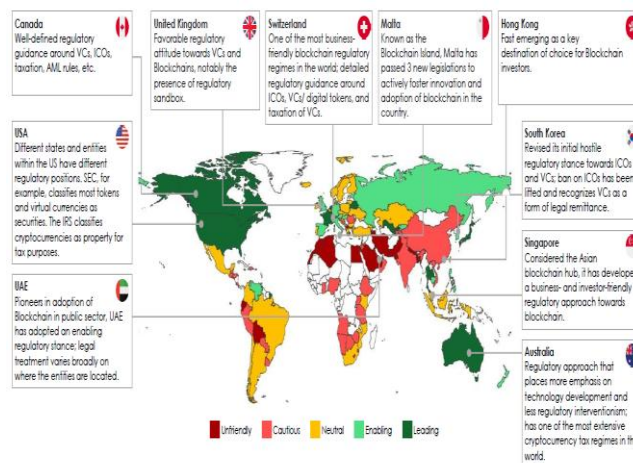
Table -I Application of Blockchain

Industry	Blockchain-based Technology / Technology Provider	Nature
Financial Services	Bitcoin, Ripple, OmiseGo	Crypto currency
Publishing	Authorship	Track the sales
Apartment Rentals/Real Estate	OmiseGo Atlant Beetoken	Renting solutions platform Issue Smart contracts to guarantee rental agreements P2P network of hosts and guests
Healthcare	ICON(ICX) Patientory, DokChain, Gem and Tierion	Inter-industry collaboration Patient data processing
Music	Mycelia Ujo Music.	Artist work and record Publish, license and compensation
Supply Chain Management	Smart contracts VeChain ShipChain	Directly connecting consumers with manufacturers. Autonomous and self-circulating Track and trace
Government	Democracy Earth Horizon State, Boule	Voting
Internet of Things	Waltonchain and IOTA Hurify	Integrate different services Find the right talent
Cloud Computing/Distributed Computing	Golem Network SONM, Supercomputer Organized by Network Mining, Elastic	Rent out idle computing resources Video rendering and scientific processes like DNA analysis. Modeling Problems
Insurance	InsureX (IXT) Etherisc, Safe Share	Alternative marketplace for insurance and insurance related services Protect against theft and damage by tenant
Charity	Alice Giveth AidCoin	Crowd funding platform Liquid Pledging Charity donations
Digital Identity Management	SelfKey Civic , TheKey	Control and manage identities Multi-factor authentication
Digital Advertising	Basic Attention Token	Reward for viewing advertisement
Credit	Blockmason WeTrust PayPie's	Credit and debt platform Friends and families pool their money Risk assessment
Forecasting/Trading	tZERO Augur, Stox, Gnosis	Online stock trading Prediction market
Energy	Power Ledger Grid+	Energy trading platform AI-based smart energy agent
Job Marketplaces	Blocklancer ChronoBank	Freelance job portal Job marketplaces
Fishing	Earth Twine	Seafood tracking solutions.

B. Legal Implications of Blockchain Technology

Christopher Kinnaird and Matthias Geipel (2017) block Chain Technology Report highlighted the legal implications of Block Chain Technology. Since all blockchain are decentralized and global, so no single legal system can shut them down. Although individuals who invest in a Decentralised Autonomous Organisations (DAO) are liable, the DAOs themselves operate outside conventional law and cannot be shut down or altered by periodic legislation enforced by the government, so if something goes wrong, for instance if funds are lost owing to a hacking attack, then it is hard to assign liability. New regulations could be updated live in the government database and businesses could automatically inform of modifications, saving time and money spent on studies. It can enable people and organizations to openly demonstrate intellectual property ownership, eliminating any uncertainty about the owner.

Digital currencies based on blockchain exist entirely outside of traditional finance, forcing tax legislation to adapt and reduce tax and adopt VAT.



Source: Avastant analysis of Blockchain regulations from a representative list of 120 countries across the world, as of December 2018
Note: Countries marked in white were not considered in the analysis.

NASSCOM 18 AVASTANT

Figure 2 Countries regulatory approaches to blockchain

Blockchain Technology: Disrupting The Current Business and Governance Model

Blockchain development and adoption requires changes in the existing public law, criminal law, private law, financial and regulatory law. The NASSCOM Avasant India Blockchain Report (2019) shows that USA, Australia, UK, Canada, Switzerland and Malta leading in formulating the regulatory approach favoured to the adoption of blockchain technology. Figure 2 highlights the countries regulatory approach towards blockchain, India is cautious in creating blockchain eco system. The regulatory aspects has to be changed in align with the new concepts, smart contracts and crypto signature, privacy and trade.

C. Changing Business Models

Witold Nowiński, and Miklós Kozma (2017) research identified blockchain technology can affect and disrupt the existing business model by authenticating traded goods through disintermediation thereby lowering transaction costs. They constructed a blockchain impact model by considering the Wirtz et al. (2016) model of integrated business model. Online technology integrates the different stakeholders into a single platform and makes it possible to come up with the new business model.

Baden-Fuller and Haefliger (2013) research studied the relation between technical innovation and business model innovation along four dimensions: customer identification, customer engagement, value delivery, and monetization with the example of tshirt manufacturer who engage customer for design and reward them with royalty.

The Gartner research report (2017) estimates that by the end of the year 2022, at a global level a minimum of one company built on blockchain technology with the worth of \$10billion and it will grow over \$176 billion in 2025 and exceed \$3.1trillion in 2030. Nearly 30% of the customer base will be in blockchain by 2030.

Emergence of Blockchain technology application in business and governance will disrupt the entire system and model and lead to a complete makeover and create a transparent, secured network. Matt Anthes (2018) identified the changing business model in terms of funding, sourcing and market pricing. Table –II summarizes the expected major changes in the functional areas of the business with the adoption of blockchain technology and figure 2 shows the estimated blockchain business value.

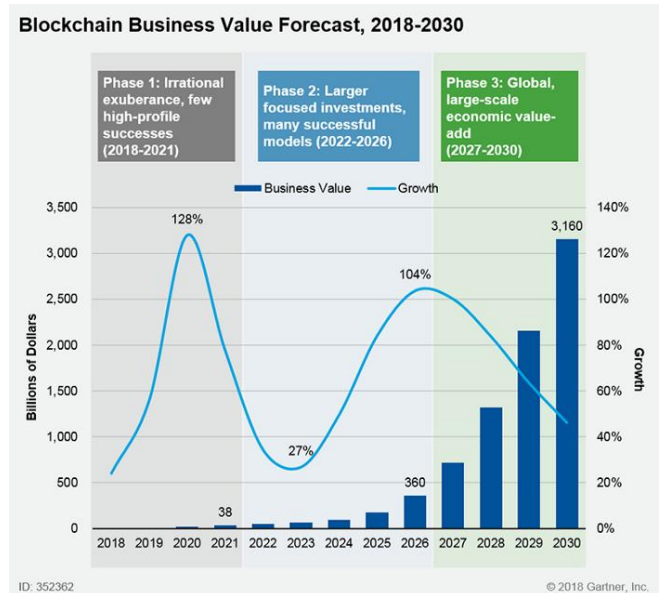


Figure 2

Table - II Changing Business Model and Functional Process

Field	Area of Application	Existing	Expected Changes
Finance	Funding	Banking and Institution	Crowd Funding Direct Funding Direct Trading of Securities Removing Information Asymmetry Instantaneous money transfer
Manufacturing and Sourcing	Product and Service Development	Traditional Intermediary sourcing and Supply chain	Innovative integrated technology oriented service and product Automate the sourcing and track the supply chain
Marketing	Promotion Pricing Distribution	Mass Advertisement and Promotion Distribution Network Intermediaries in various Marketing Function	Customized Promotion and Reward Direct Selling Authenticated Buying Market Pricing
Human resource	Recruitment Employment	Traditional medium Permanent, Part time Employees	Market Place for Skills Global Skill sourcing Freelance Workers

D. Implementation Difficulties

Embracing Blockchain technology presents a new set of internal and external challenges to companies. The hurdles ranging from constructing business case, making it as a cultural fit, creating stakeholder support system and fulfilling government requirements. The major challenge associated with blockchain is a lack of awareness of its application in various sectors and lack of understanding of its operation. This hampers investment and the exploration of ideas in blockchain technology. Cognizant Report (2017) shows that

the majority of senior executives in Asia Pacific felt difficulty in identifying the blockchain business use cases, reengineering the business processes and working with ecosystem members. Creating industry-wide collaboration among participants, exchanges and regulators is critical to rapid blockchain implementation.

The global survey of Deloitte (2018) on block chain revealed that the regulatory issues, Implementation, replacing or adapting to legacy system, skilled human resource, Potential security threats and uncertain ROI are the major issues the respondent highlighted. Regulatory issue in implementation of blockchain technology is the major barrier. The existing law has to be modified with the concepts and methods and introduction of smart contract, cryptographic signature, data privacy and data storage. USA is pioneer in adopting blockchain technology and amending regulation; in 2018, 17 US state legislatures have passed dozens of bills relating to the adoption of blockchain technology. Addressing to the issue of skilled labour in the field of block chain as far as India is concerned this may not be the critical issue for the development of this technology. The survey of report of Taras Filatov, (2018) shown in table III highlighted that USA and India are the top most countries with most blockchain developers available. This research finding was based on the data collected from the professional network LinkedIn.

Deloitte suggested that to accelerate the blockchain technology development more firms in an industry has to collaborate to work on the shared pain or opportunities which encourage standardisation. The distributed ledger technology facilitates transaction across the network the value increases with the number of users. The report of David et.al (2018) shows that, the development of blockchain Consortia is more than doubled and currently at 61. Even though only few consortia develop and active in blockchain technology the growing participation by government, corporates, and technology providers will increase the adoption of technology.

From user point of you Blockchain technology's immutability may have an adverse side also. It is impossible to remove the unwanted data integrated in a blockchain. Its application in certain sector questions the acceptability of the technology due to security and privacy concern. To transact through blockchain asset has to be digitized. Application in

the field of agriculture and other sectors requires the supporting technologies like IoT and biometrics to connect with this technology in the form of sensor or other physical item for data collection and verification and this will hamper the security of a blockchain technology since the connected item can be tinkered.

III. INDIA’S BLOCKCHAIN ADOPTION POLICY

According to Avasant Nasscom report (2019), in India public sector initiated more than 40 blockchain project and 92 of this project is at pilot stage and 8% are in product stage. State and central government in India initiated measures to build eco system for blockchain technology. Telangana, Andhra Pradesh and Karnataka state government leading with the integration of start-ups, service providers and academic institute to promote blockchain technology by creating a Centre of Excellence labs and innovation centre.

A draft Enabling Framework for Regulatory Sandbox was published by the Reserve Bank of India (2019) to promote the country's quickly increasing fintech area. Initially, 10-12 organisations have been chosen for sandbox testing process which focuses on financial inclusion, payments and loans, digital KYC, etc. As per RBI guidelines, the cohorts (an end-to-end process of sandboxing) may run for different periods of time, but should usually be finished within six months. A regulatory sandbox generally relates to live product tests or service tests within a controlled / test regulatory setting in which regulators for the restricted purpose of testing may (or may not) allow certain regulative relaxation. The cohorts should show how, through their product/service, they would solve a current gap in the financial system and show that their deployment has an appropriate regulatory barrier.

Table III- Blockchain developers worldwide by country (absolute numbers)

N	Country	Ethereum	Solidity	Blockchain	Hyperledger	Total, est.
1	United States of America	5,818	3,184	44,979	1,772	27,876
2	India	2,381	1,432	19,627	1,579	12,509
3	United Kingdom	1,219	645	13,076	372	7,656
4	Canada	990	560	7,196	342	4,544
5	France	746	426	7,152	242	4,283

Source: Dapros Research Report 2018

A. Adoption of BT in India

India's first blockchain banking transactions were carried out in international trade finance in 2016 with the transfer funds between Emirates NBD, a Dubai-owned renowned bank and ICICI Bank. The first corporate Blockchain based transaction was executed between Reliance Industries and Tricon Energy USA on November 2018. By using R3’s Corda block chain platform ING Bank Brussels issued block chain based Letter of Credit and HSBC India acted as an advising bank. NSE the National stock exchange of India tested Block chain based e-voting for listed companies.

In March 2018 the India’s online bill discounting exchange Trade Receivables Discounting System (TReDS) — Receivables Exchange of India (RXIL), A.TReDS, and M1xchange have joined and implemented the first blockchain-based trading platform to discount the trade receivables and get finance by MSME’s from corporate buyers through several financiers and prevent fraud in their activities. Table I shows the application of Blockchain technology in India till now. Blockchain execution will help MSMEs improve their funding with better interest rates.



Blockchain Technology: Disrupting The Current Business and Governance Model

NITI Aayog tying up with Apollo hospital chain will assist the hospital chain across India take their entire blockchain inventory to assist reduce counterfeit drugs and boosts efficiencies.

Moreover, the government will get a bird's eye perspective of all the supplying drugs and can recognize and track discrepancies.

The NASSCOM-Avasant India Blockchain Report (2019) revealed that more than the fifty percentage of Indian state government took initiative to adopt blockchain technology in

the field of digital certificate, land registry and farm insurance which is clearly shown in Figure 3.

State government of Telangana, Andhra Pradesh formulated a policy to promote the eco system for block chain technology and aimed to create a Blockchain District. Development of eco system for blockchain technology rest with developing talent pool, promoting research, building infrastructure, developing community and collaboration. Telangana government offers subsidies, incentive package, infrastructure and grant for blockchain start-up.

Table IV- Application of Block chain in India

Industry	Company implementing Blockchain Technology / Propose to implement BC	Areas of Application	Outcome expected
Banking	ICICI BANK YES BANK AXIS BANK HDFC STATE BANK OF INDIA	<ul style="list-style-type: none"> o Trade Finance and KYC o Payments remittance o Asset Inventory Audit o Anti-Money Laundering o Smart Contract o Land record Validation 	<ul style="list-style-type: none"> o Remove Paper work o Estimated 7% reduction in cost o Instantaneous Transaction o Removal of Intermediaries and quick processing.
Exchange	Trade Receivables Discounting System (TReDS) Receivables Exchange of India (RXIL) A.TreDS and M1xchange	<ul style="list-style-type: none"> o Discount the trade receivables o Financing 	<ul style="list-style-type: none"> o Prevent Fraud o Funding from Corporate
Healthcare	Apollo hospital	<ul style="list-style-type: none"> o Pharmacy 	<ul style="list-style-type: none"> o Tracking Pharmacy supply
Insurance	Policybazaar.com,	<ul style="list-style-type: none"> o Day-to-day operations o Protection from fraud o Data protection and timely payment 	<ul style="list-style-type: none"> o Avoid Fraud
Retail	Shoppers Stop, Future Group, Globus, Gini & Jony, Croma, and Bestseller (Jack & Jones, Vero Moda & Only	<ul style="list-style-type: none"> o identification platform 	<ul style="list-style-type: none"> o Prevent fraudulent distributors to pass off bogus goods
Electrical and Home Appliances	Bajaj Electricals Ltd	<ul style="list-style-type: none"> o Vendor financing 	<ul style="list-style-type: none"> o Timely processing of the vendor payment o track the status of the transactions on real time basis

Source: Nagasunder Sharanappa (2018), Subrata Siddhanta (2018)

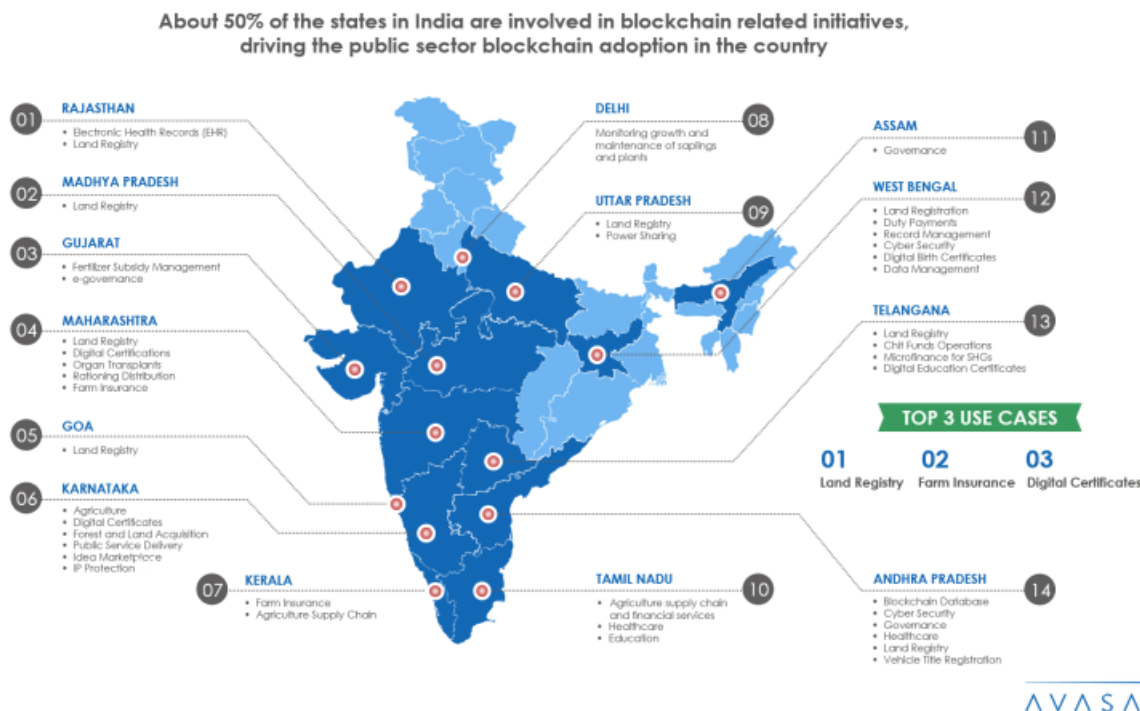


Figure 3

Source: NASSCOM-Avasant India Blockchain Report 2019

IV. CONCLUSION

Blockchain will influence how people and organizations communicate, how companies work with each other, how procedures and information are transparent, and eventually how our economy is productive and sustainable. The World Economic Forum survey (2015) suggested that by 2027 nearly 10 percent of global GDP will be stored on blockchain. CBI Insights (2018) stated that disruption doesn't happen overnight since still in its infancy and a lot of actual technology is still in pilot study stage. It takes time to create, implement and affect. It will bring trust between multiple parties, reduce costs, increase efficiency, and improve security. As the blockchain ecosystem develops steadily at global level, the opportunities for more substantial change will improve over the next decade. This paper analysed the blockchain technology, its adoption at global level, current development and application of blockchain technology, its implementation difficulties and application in different sector in India. Through this research it is evident that Indian state and central government is taking a leadership role in blockchain technology and leverage the opportunity and formulated a policy framework which will create ecosystem for the development of blockchain technology in India.

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