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# NASSCOM Avasant India Blockchain Report 2019

## Executive Summary

February 2019

# Executive Summary (1/2)

## Global blockchain traction

Blockchain's transformational potential has been recognized by enterprises and governments across the world. Over 50 countries have already embarked on initiatives to integrate blockchains in their economies and to develop a strong holistic blockchain ecosystem.

## Global blockchain investment surge

2018 can easily be considered a watershed year as far as investment in blockchain companies and startups is concerned. Global blockchain investments through venture capitalist and initial coin offerings reached over USD 20B and covered a wide range of industries, technologies and use cases.

## Blockchain 3.0 and real business value

Blockchain technologies are evolving. Blockchain 3.0, which provides enhanced interoperability, scalability and security is becoming mainstream. This is opening up opportunities for blockchain to scale and create real business value.

## Shift from experiment-centric to business-case-centric adoption

Globally, enterprises have established the potential of blockchain through proof-of-value engagements and by tracking bellwether implementations of peer firms. 70% of enterprise blockchain projects are now commissioned through stringent business case evaluations on cost savings and operational efficiency improvement potential.

## Critical need for reskilling and upskilling to address demand

Blockchain talent and capabilities, for both foundational platform programming and blockchain application development, are extremely scarce across the globe due to technology nascency and low number of live engagements. Enterprises, governments and providers are investing in innovative ways to build in-house talent.

# Executive Summary (2/2)

### Indian public sector driving interest in blockchain

Nearly half the states in India have initiated blockchain projects to address different elements of citizen service delivery. While most projects are in the pilot stage, the state governments have taken a progressive approach to ensure start-ups and niche providers have a conducive framework to participate in these initiatives.

### Multi-sector growth opportunities

In addition to the public sector, private enterprises across all key industries in India are also identifying different applications of blockchain. The BFSI sector has seen the highest adoption, but other industries, including healthcare, retail and logistics are also accelerating rapidly.

### Need for regulatory certainty

Industry participants in India are constrained due to the cautious regulatory approach taken with respect to specific elements of blockchain such as cryptocurrency and digital assets. A proactive, consultative and defined regulatory approach to blockchain will boost the blockchain ecosystem growth in the country.

### Significant growth headroom for Indian blockchain start-ups

Indian start-ups have not been able to tap into the global investment surge in blockchain, cornering only about 0.2% of the investments. There is an urgent need for a conducive regulatory and government procurement policy environment to accelerate start-up growth and drive the sector forward,

### Unique opportunity to become blockchain service providers to the world

Service providers in India, with their deep enterprise client relationships, are uniquely positioned to address a large share of the global blockchain demand. They will need to invest rapidly in talent development, IP and asset creation and process framework advancement to maximize the opportunity.

# Countries are using policy and regulations as a key lever to enable Blockchain ecosystem development

## ISO Standards

**52**

Countries that are participating or observing members in the development of Blockchain Standards with the International Standards Organization (ISO).

## Europe Leads

**~50%**

% of leading and enabling blockchain jurisdictions in the world that are located in Europe.

## Blockchain License

**40**

Countries that mandate some form of license requirements for trading, purchase and sale of cryptocurrencies, operation of ICOs or crypto exchanges.

## Regulatory Sandbox

**26**

Countries that have a Fintech/Blockchain regulatory sandbox that enables start-ups/ technology providers to test their products and services with a limited number of real consumers for a trial period without being subject to normal regulations.

## New Regulations

**7**

While several countries apply existing regulations for blockchain, 7 countries have developed specialized Blockchain/DLT-specific regulations.

## Digital Currencies

Japan recognizes Bitcoin and other digital currencies as legal tender, and digital currency exchanges are legal to operate if they are registered with the Japanese Financial Services Agency.

Source: Avasant Analysis

# 2018 has been a tipping-point year for Blockchain investments globally

**2018 Outpaced Total Historical Investment**

Venture capital investment in Blockchain initiatives in 2018 (USD 3.17B), exceeded the total value of investment in the past 5 years from 2012–2017 (USD 2.56B).

**USD 10M**

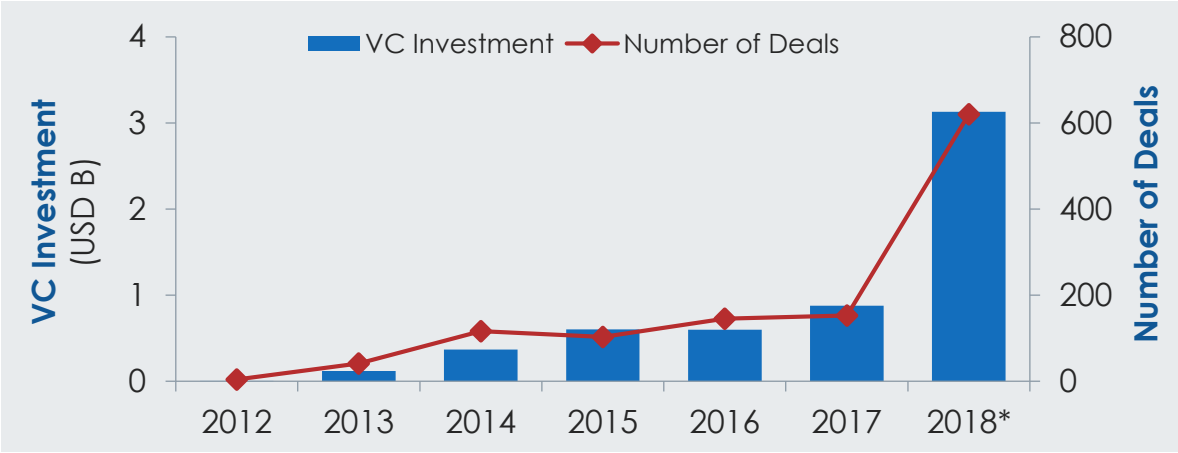
**Higher Average Fundraising vs VC Funding**

In addition, the median ICOs investment was over 10 times the median of venture capital round for blockchain firms, i.e., USD 10M vs USD 900K.

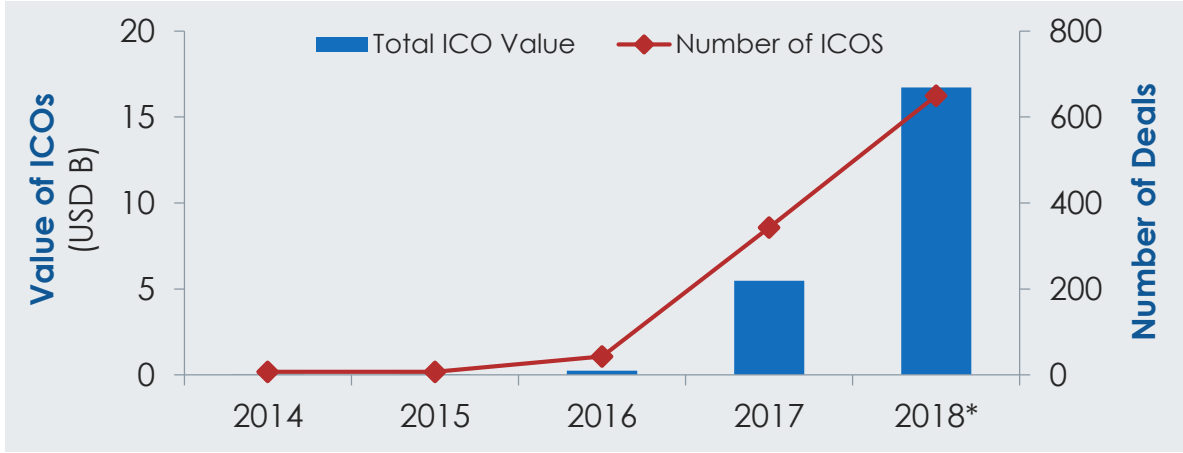
**Increasing Diversity in the Investor Base**

Reverse ICOs where an established firm raises funds through an ICO and adopts a tokenized business model are also becoming mainstream, e.g., Kik messenger raised nearly USD 100M in a ICO token sale in 2017,

## Venture Capital Investment in Blockchain Firms




## Growth in ICO Funding




Source: Avasant Analysis, Coindesk Blockchain Venture Capital Tracker

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# Unlike the past, investments have been well-distributed across major industries, with greater focus on solutions around payments and exchanges

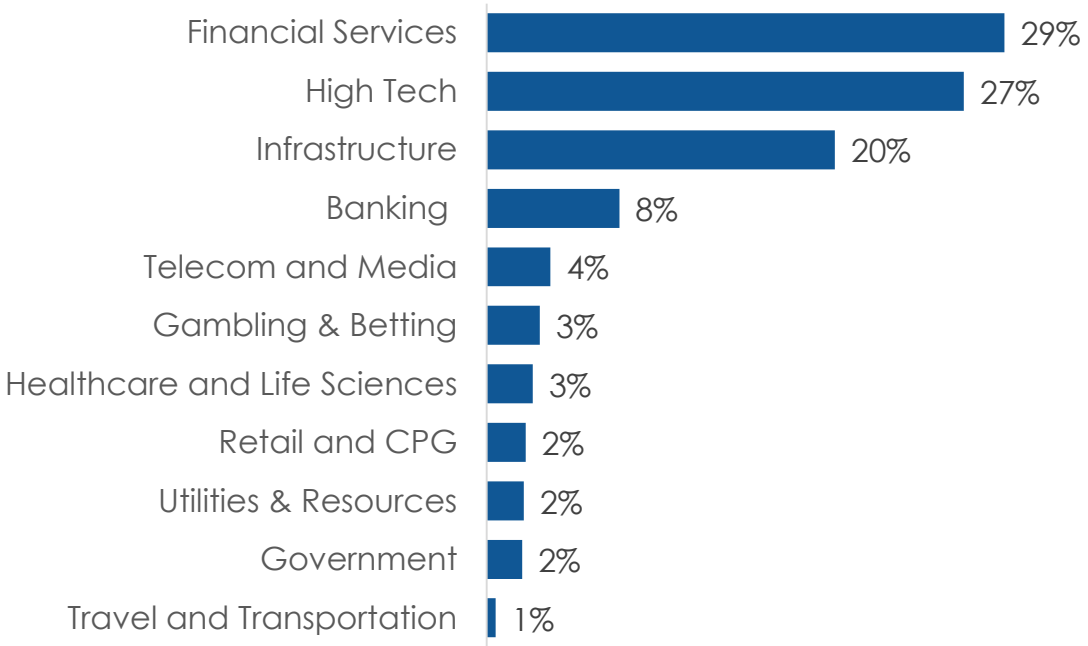
### Increasing Diversity in ICO Investment

While Banking and Financial Services industry remains the primary focus of ICO financing, global ICO Investments hint at an increasing diversification in investments, with greater focus on High-Tech blockchain solutions.

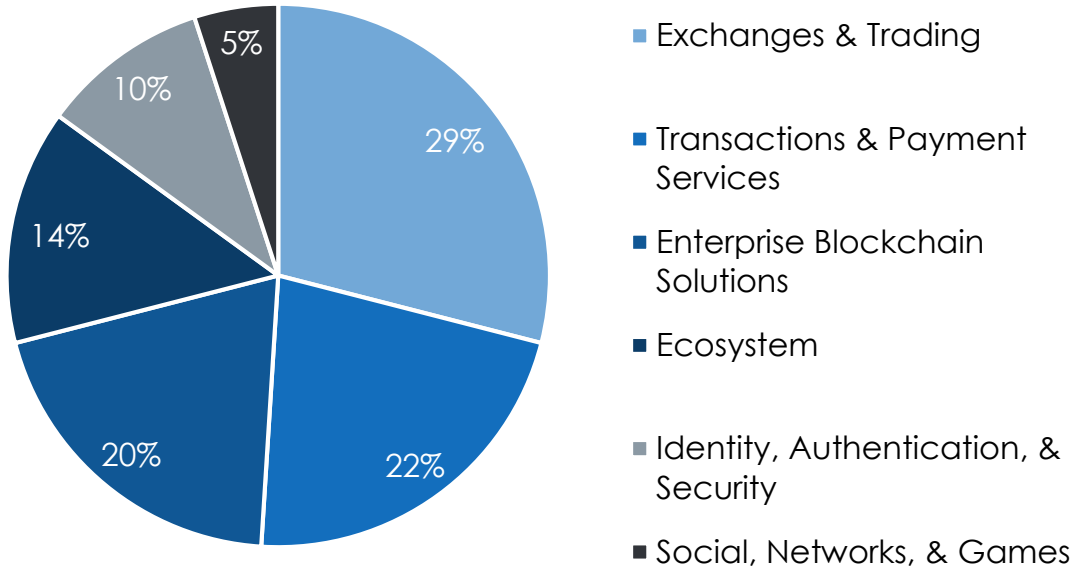
### Increased Funding towards startups offering payments and exchange solutions

Funding has been predominantly concentrated towards start-ups offering solutions related to payments, digital wallets, peer-to-peer lending, crypto-exchanges, etc.

## Number of ICOs by Industry




## Distribution of VC investment in top-funded Blockchain Start-ups




Source: Avasant Research, Techcrunch – Crunchbase, Pitchbook dataset, CoinSchedule, 2018

# However, investments in the Indian Blockchain ecosystem have been relatively low, at less than 0.2% of the global investments

Investments through VC firms or ICOs in the Blockchain ecosystem in India has been considerably low (totaling to USD 8.5M) due to the uncertain policy and regulatory environment in the country.

Some of the initial, sizeable investments in India were on crypto-exchanges such as Unocoin and Zebpay, which have now disabled trading through fiat currency due to an RBI directive.

A restrictive regulatory environment in India is limiting the investment opportunities from both domestic and global investors into Indian start-ups.

Several India-based investors are raising funds through VCs and ICOs in other jurisdictions such as Malta, Singapore, UK, Switzerland, etc. that have enabling regulatory environments.

Due to the regulatory risk around Blockchain in India, its start-ups find it difficult to enter the radar of global investors that are specifically looking to invest in blockchain start-ups developing innovative solutions.

| Start-ups | Funds Raised | Latest Round of Funding | Investors |
|---|---|---|---|
| Signzy | USD 3,600,000 | Series A | Stellaris Venture Partners and Kstart (Kalaari Capital's seed initiative) |
| Unocoin | USD 1,500,000 | Seed | Blume Ventures, Bitcoin Capital, Digital Currency Group (DCG), Boost VC, Funders Club |
| Elemential Labs | USD 1,000,000 | Seed | Matrix India Asset Advisors, Eight Innovate Ventures and Investopad |
| Zebpay | USD 1,000,000 | Seed | Arjun Handa, CMD of Claris Life Sciences, and Amit Jindal, MD of Jindal Worldwide |
| Diro Labs | USD 1,000,000 | Seed | Info Edge |
| Nuo Bank | USD 250,000 | Seed | CitrusPay founders Amrish Rau and Jitendra Gupta |

Source: Avasant Analysis and Research

# With the emergence of Blockchain 3.0 and its increased security, interoperability and scalability, enterprise adoption is set to accelerate

## Blockchain 1.0

The first-generation blockchain platforms were a demonstration in the potential of the technology but lacked key features that could be used to support use cases beyond financial services applications.

### Key Challenges

- Limited throughput
- Slow transaction confirmations
- Pseudonymous network participants
- Limited applicability
- Decentralized governance based on consensus
- No privacy
- Large energy consumption

## Blockchain 2.0

The second generation of blockchain platforms were focused on building an adaptable ecosystem that could be used to support the deployment of decentralized applications.

### Key Challenges

- Interoperability between diverse platforms
- Limited privacy
- Limited throughput: The bitcoin network - 7 tps Ethereum 15 tps, VISA 24,000 tps
- Interoperability
- Governance
- Sustainability

## Blockchain 3.0

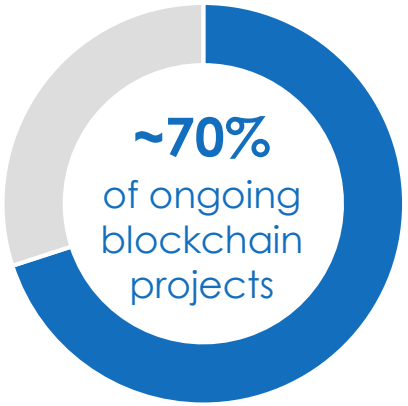
The third generation of Blockchain platform, which is based on the Directed Acyclic Graph (DAG) principle, presents enterprises with new opportunities to implement Blockchain technology at a large scale due to its ability to overcome the challenges posed by Blockchain 1.0 and 2.0 platforms.

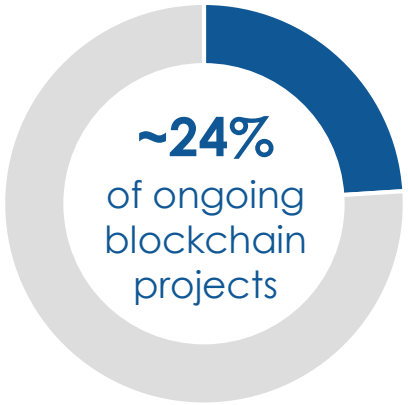
### Key Benefits

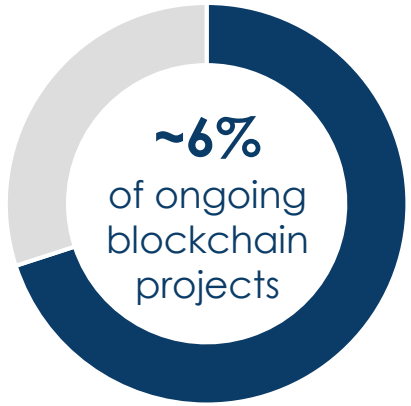
- Higher throughput enabling faster transactions - approx. 10,000 tps
- Interoperability eliminating siloed implementation and enabling industry-wide implementations
- Better security
- More cost-effective
- Lower energy consumption due to miner-less operations
- Better sustainability

Source: Avasant Analysis and Research

# Value demonstration through proof-of-concept and pilot engagements will help build momentum towards enterprise adoption




| Proof-of-Concept | Pilot | Production |
|---|---|---|
| • Large-scale ongoing use case experimentation<br>• Mix of pragmatic, competitor-matching and moonshot use cases<br>• Providers use POCs to develop capabilities<br>• Existing client-provider relationships most likely to commence POCs | • Implementations on parts of business processes or in test environments<br>• Projects scrutinized for efficiency, benefits and enterprise-wide scalability<br>• Integration with legacy and change management plans are critical<br>• Forms the highest opportunity space for conversion to production projects | • Mostly present in a consortium environment, or with one influential participant in the network<br>• Ongoing integration with legacy systems<br>• Leadership push at enterprises drives change management |

Source: Avasant Blockchain Services RadarView 2018

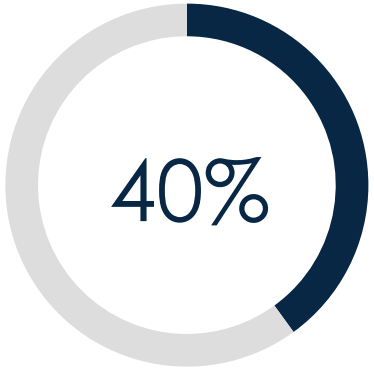
# No longer swayed by hype, progressive enterprises now expect tangible business outcomes with the implementation of blockchain solutions

**Over 70%** *of the Blockchain projects that will be implemented in 2019 will be expected to provide direct cost savings or achieve process efficiency for enterprises*

- The first-generation blockchain platforms were a demonstration in the potential of the technology but lacked key features that could be used to support use cases beyond financial services applications.
- Key challenges are limited throughput, slow transaction confirmation, delayed settlement finality, no privacy and high energy consumption in mining.
- With the business benefits of blockchain becoming clearer to enterprises, a sizeable share of the projects are expected to pass the business case evaluation barrier and move into production in 2019.

Source: Avasant Blockchain Services RadarView 2018

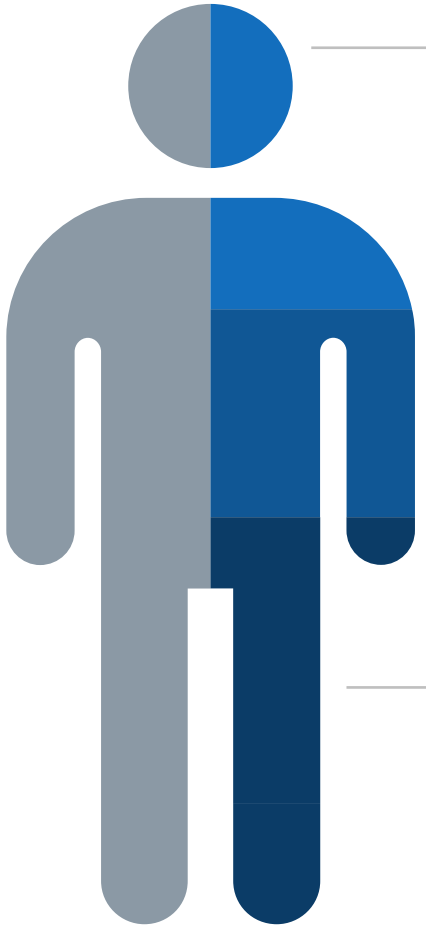
# Talent upskilling is the biggest challenge facing providers across India and the world; providers are trying to address the gap through cross-training




Demand for blockchain talent is growing at over 40% per quarter

## Shortage of Industry-Ready Resources

- There is a shortage of skilled resources with expertise in Blockchain, i.e., there are only 45,000 to 60,000 skilled resources who are industry-ready globally.
- In India, service providers are finding it difficult to hire resources (especially at the mid or senior level) with expertise and experience in proofs-of-concept, pilots or implementations of Blockchain solutions.



### Cross Training Programs

- Service Providers in India are conducting 4-6 weeks of training programs for inhouse employees to train on Blockchain capabilities

### Existing Workforce Utilization

- Service Providers are building abstraction layers on top of existing platforms to enable employees skilled in widely used development languages like Java and C++ to code on it, thereby saving on cost of hiring.

### Private and Public Sectors

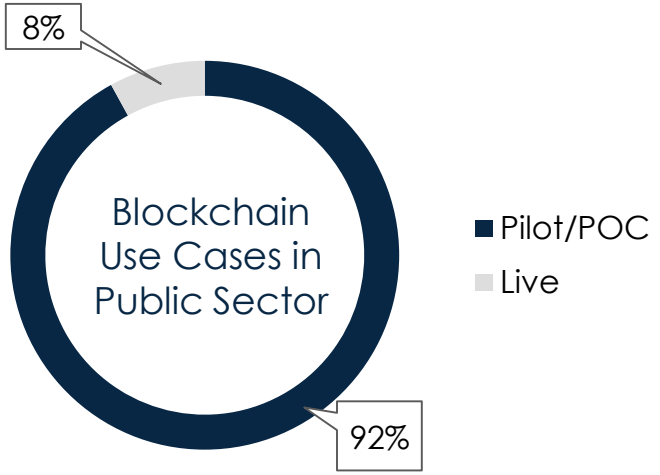
- Service Providers are collaborating with platform providers like Ripple, R3 Corda and Hyperledger to certify employees.
- Service Providers are also collaborating with the public sector for large-scale employee training like Tech Mahindra through the Blockchain District initiative.

Source: Avasant Blockchain RadarView Report, 2018, Financial Times, 2017, Avasant Research

# India's public sector is fast emerging as a large consumer of Blockchain technology

The government is playing an important role not only as a regulator but also as a consumer of Blockchain solutions in India

- Currently, 40+ Blockchain initiatives are being executed by the public sector in India, with ~92% in pilot/POC phase and ~8% projects in the production phase.
- Since a majority of the initiatives kicked off in early 2018, the benefits of these projects would be realized only in 2019 onwards.
- Compared to 2017, projects in POC phase increased 7 times while projects in the pilot phase increased 6 times.
- Most applied use cases are land registry, securing digital certificates on blockchain and governance.
- The government of Telangana and the government of Andhra Pradesh are two of the leading states in terms of blockchain adoption in India.

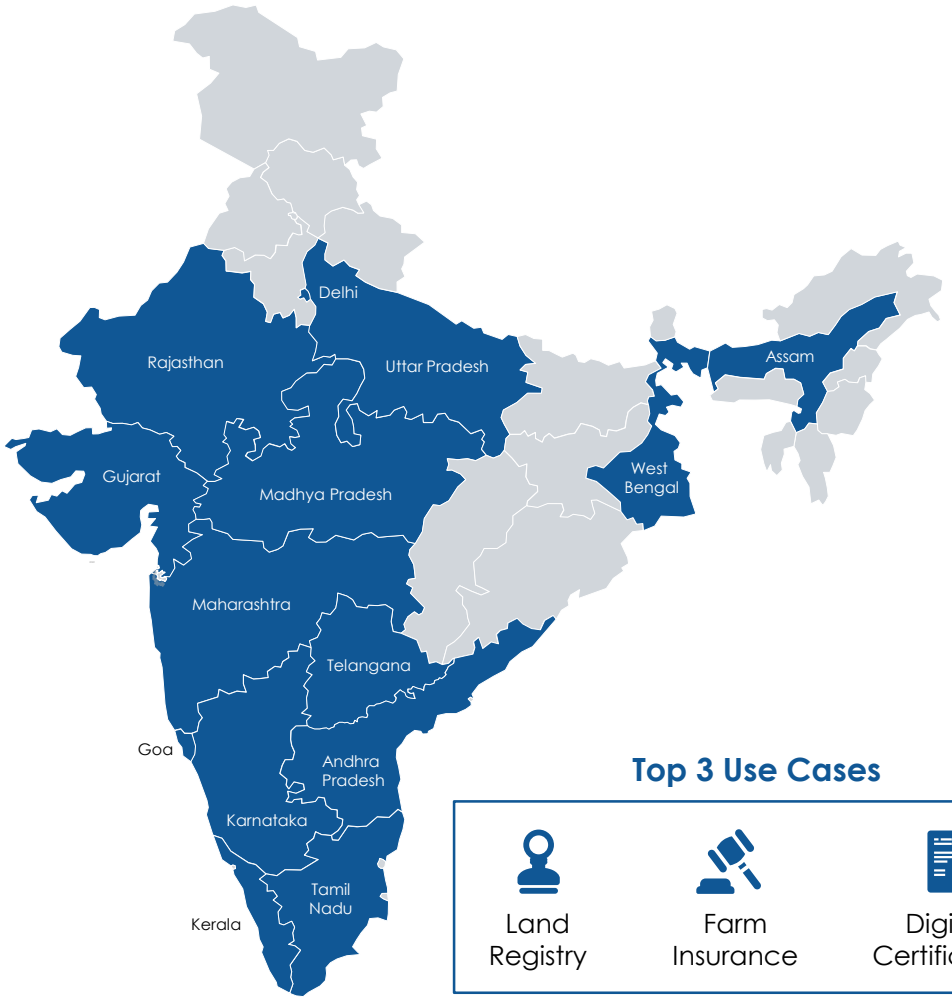



**Prevalent use cases in India's public sector**

- Land title registry
- Citizen electronic health record management
- Digital certificates
- Benefit distribution
- Eliminating counterfeit drugs
- Farm insurance
- Identity management
- Power distribution
- Duty payments
- Vehicle lifecycle management
- Organ tracking for transplant
- Rationing
- e-Governance
- Chit fund operations administration
- Microfinance for Self-Help Groups (SHG)
- Cybersecurity
- Agriculture supply chain

Source: Avasant Blockchain Services RadarView 2018

# About 50% of the states in India are involved in Blockchain-related initiatives, driving the public sector blockchain adoption in the country




**Top 3 Use Cases**

- Land Registry
- Farm Insurance
- Digital Certificates

**Andhra Pradesh**
- Blockchain Database
- Cybersecurity
- Healthcare
- Land Registry
- Vehicle Title Registration

**Assam**
- Public Service Delivery

**Delhi**
- Monitoring Growth and Maintenance of Saplings and Plants

**Goa**
- Land Registry

**Gujarat**
- Fertilizer Subsidy Management
- e-Governance

**Karnataka**
- Agriculture
- Digital Certificates
- Forest and Land Acquisition
- Public Service Delivery
- Idea Marketplace
- IP Protection

**Kerala**
- Farm Insurance
- Agriculture Supply Chain

**Madhya Pradesh**
- Land Registry

**Maharashtra**
- Land Registry
- Digital Certifications
- Organ Transplants
- Rationing Distribution
- Farm Insurance

**Rajasthan**
- Electronic Health records (EHR)
- Land Registry

**Tamil Nadu**
- Agriculture
- Healthcare
- Education

**Telangana**
- Land Registry
- Chit Funds Operations
- Microfinance for SHGs
- Digital Education Certificates

**Uttar Pradesh**
- Land Registry
- Power Sharing

**West Bengal**
- Land Registration
- Duty Payments
- Record Management
- Cybersecurity
- Digital Birth Certificates
- Data Management

Note: This is not an exhaustive list use cases done by different state governments currently.
Source: Avasant Research

# State Governments are collaborating with different stakeholders to accelerate Blockchain adoption in public sector projects

The government of Andhra Pradesh is working with Zebi data for blockchain-based solutions in land registry. The government is also partnering with Hitachi to set up an online citizen governance platform.

The Telangana government has signed a MoU with Tech Mahindra and is collaborating with IIIT Hyderabad and C-DAC to build a state-level Blockchain platform. It is also collaborating with NITI Aayog for blockchain in governance.

The Maharashtra government has signed an MoU with the Swiss government to share ideas on Blockchain technology and its applications.

The Tamil Nadu government has signed a MoU with IIT Chennai to explore Blockchain applicability in different use cases.

The municipal corporations of Bankura and Durgapur districts in West Bengal have partnered with the Netherlands-based company Lynked.World to build a blockchain-based platform for issuing birth certificates.

The Assam government is collaborating with Nucleus Vision to set up Blockchain solutions for governance process and other citizen-facing applications.

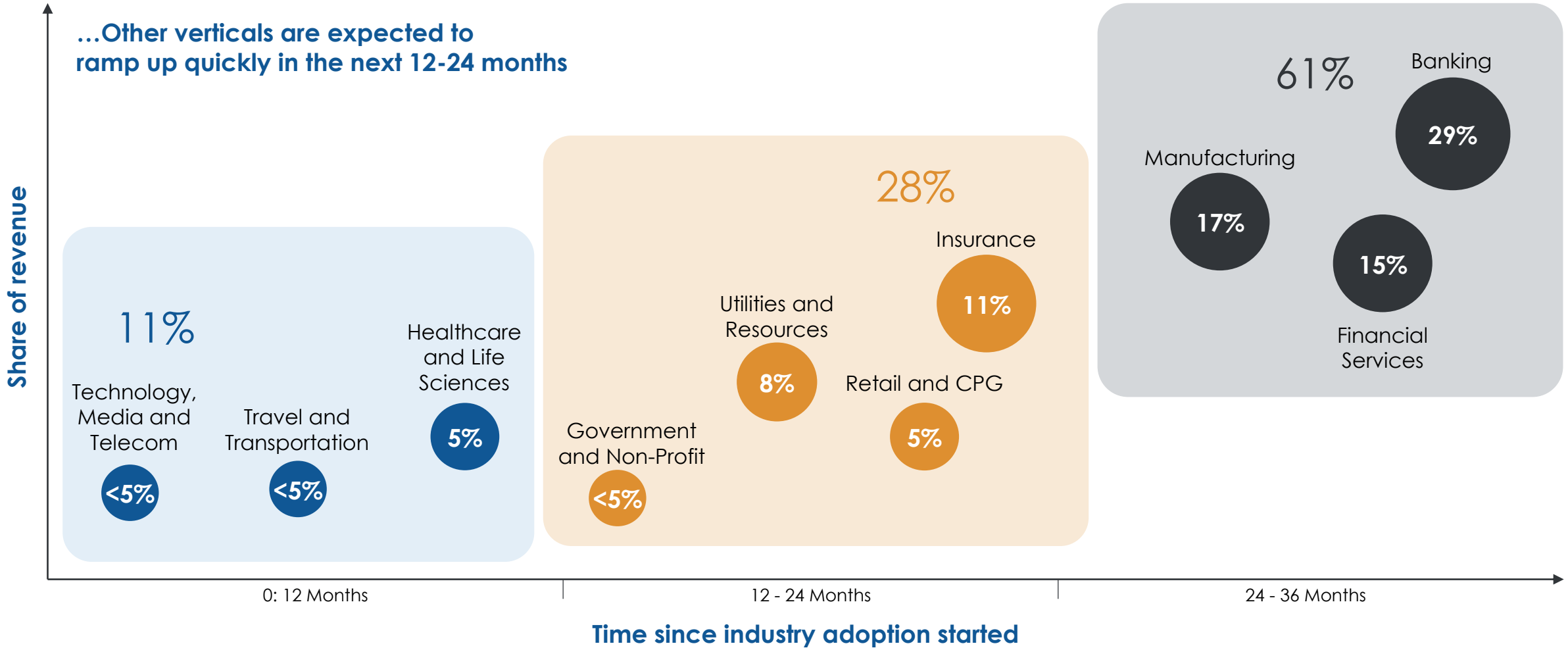
The Uttar Pradesh government has partnered with UNDC to implement a Blockchain solution in land title management.

In 2016, the Gujarat government was collaborating with Zebpay to explore blockchain technology applications in the state.

The Rajasthan government has partnered with Mumbai-based Auxesis group to implement a Blockchain solution in electronic health records and land registration.

Note: This is not an exhaustive list of partnerships done by different state governments currently.
Source: Avasant Research

# Globally, amongst enterprises, blockchain revenue is concentrated in 3 key industries: banking, manufacturing and financial services




Source: Avasant Blockchain Services RadarView 2018

# In India, BFSI leads in adoption, although other industries such as healthcare, retail and manufacturing are catching up

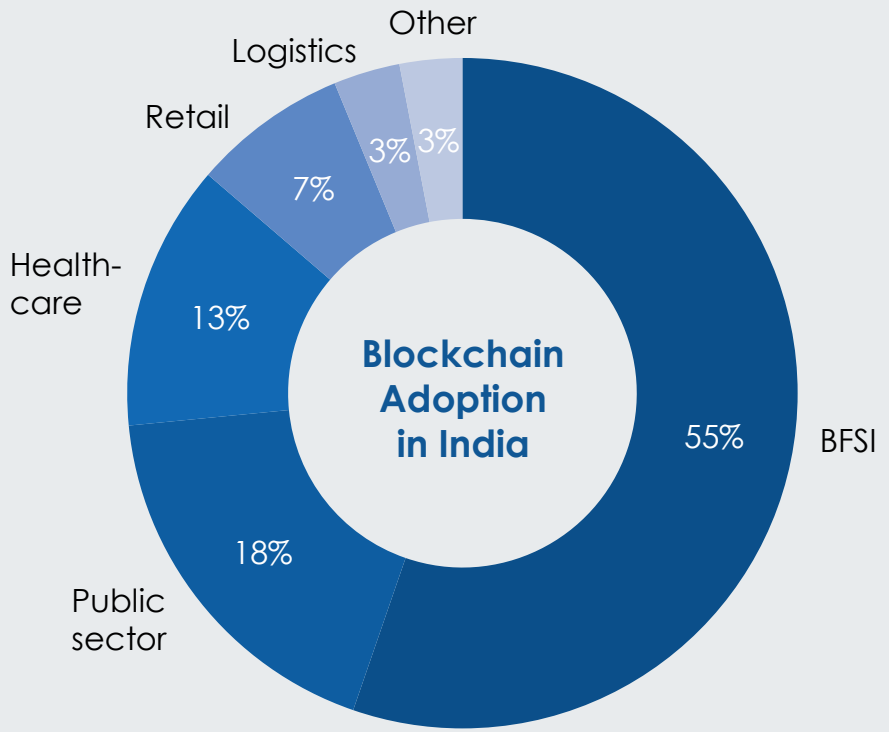
The BFSI sector is leading the blockchain adoption in India. There are more blockchain solution implementations across major banks and insurance companies.

Enterprises are collaborating with both start-ups and service providers for implementation programs.

Specialized groups like Bank Chain and Insurance Consortium are driving nationwide initiatives.

**10+** Currently, BFSI sector has the maximum production level implementations in India.

**There is significant potential for growth in enterprise adoption of Blockchain in the healthcare, retail and manufacturing sectors in India**




Source: Avasant Analysis and Research

# Enterprises across the industry spectrum are exploring blockchain; providers are also building aligned solutions and offerings

## Financial Services

- **Trade finance**
- Securities issuance
- Derivatives settlement
- Dispute management
- Forex trade
- Fund processing
- Risk management
- **Secure record keeping**
- Identity management

## Utilities and Resources

- Electricity grid management
- Energy trading
- Shared equipment
- Green certification
- Produce logistics
- Wholesale energy supply

## Travel and Transportation

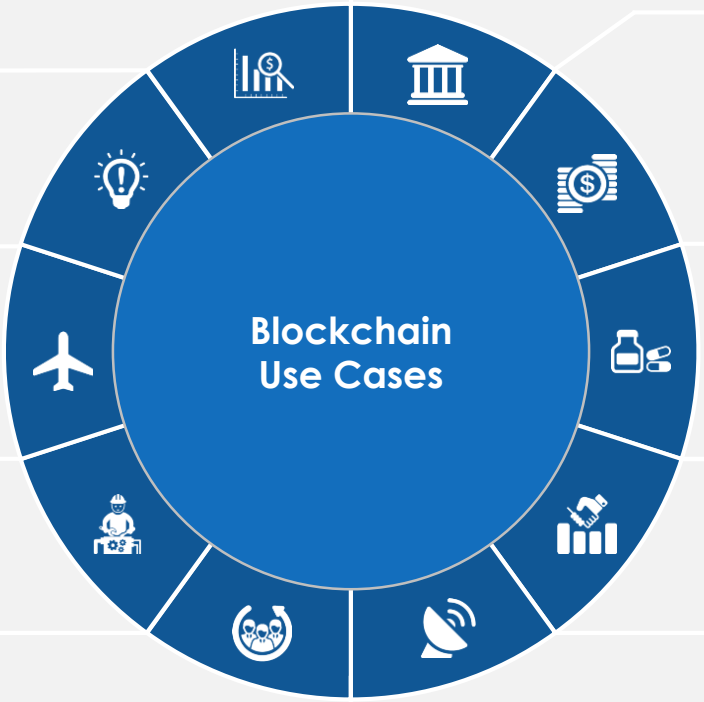
- Cargo track and trace
- Damage tracking
- Preventive maintenance
- Ticketing
- Customer data sharing
- **Shipping documentation**

## Manufacturing & Supply Chain

- 3D design records
- **Anti-counterfeiting**
- Digital provenance
- Preventive maintenance
- **Supply chain management**
- Warranty and payments

## Insurance

- **Claims management**
- Reinsurance
- Contract authentication
- **Customer data-sharing**
- Insurance marketplace
- Insurance records
- **KYC**
- **P2P Insurance**




## Government and Non-Profit

- **Asset registration**
- **Asset tracking**
- **Digital land and vehicle registry**
- Digital currency
- **Digital identity**
- Digital voting
- **Food distribution**
- Secure travel for refugees

## Banking

- Asset certification
- **Trade finance**
- **Cross-border payment**
- **Client onboarding**
- Audit trail
- **Inter-bank payments**
- **KYC**
- **Syndicated loans**
- Identity management

## Healthcare and Life Sciences

- **Cold chain tracking**
- **Drug provenance**
- **Health records**
- Organ registry
- **Pharma track-and-trace**
- Physician recertification
- Provider data management

## Retail and CPG

- Distributed marketplace
- Food auditing
- Inventory control
- Loyalty programs
- Procurement optimization
- **Supply chain traceability**

## Technology, Media and Telecom

- Product provenance
- **IP management**
- **Fraud detection**
- Micropayments
- Media IP protection
- Loyalty programs

Note: Bold use cases indicate higher adoption in India
Source: Avasant Blockchain Services RadarView 2018

# Countries have taken different regulatory approaches; India has a cautious approach towards shaping the blockchain ecosystem

**Canada**
Well-defined regulatory guidance around VCs, ICOs, taxation, AML rules, etc.

**United Kingdom**
Favorable regulatory attitude towards VCs and Blockchains, notably the presence of regulatory sandbox.

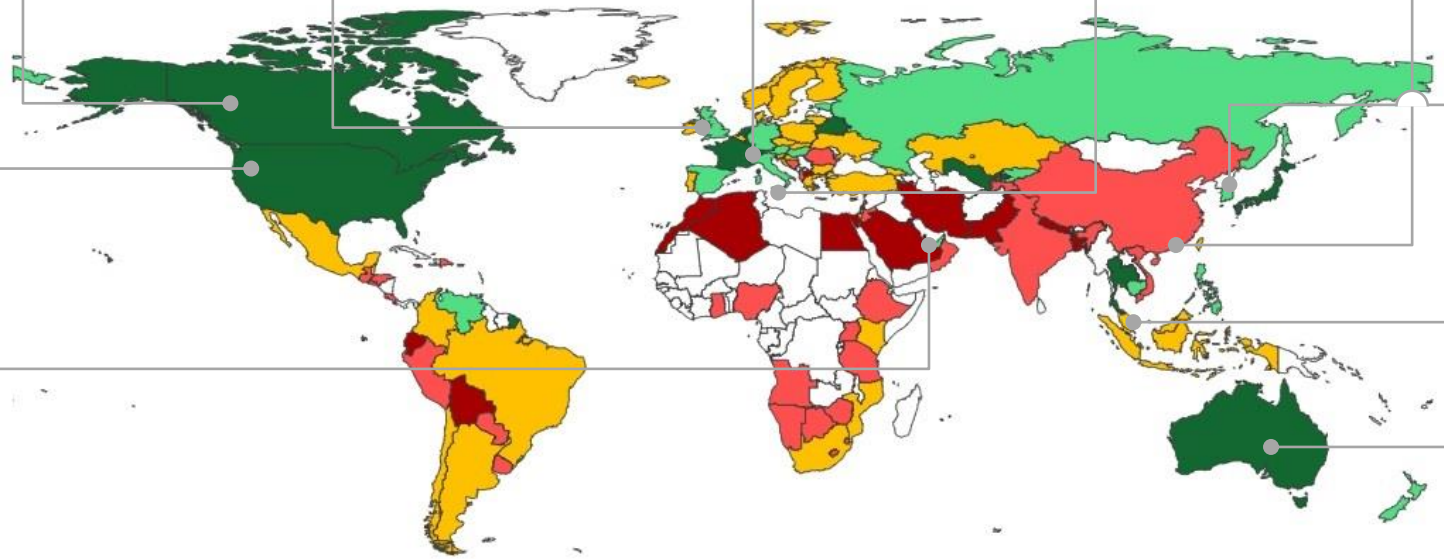
**Switzerland**
One of the most business-friendly blockchain regulatory regimes in the world; detailed regulatory guidance around ICOs, VCs/ digital tokens, and taxation of VCs.

**Malta**
Known as the Blockchain Island, Malta has passed 3 new legislations to actively foster innovation and adoption of blockchain in the country.

**Hong Kong**
Fast emerging as a key destination of choice for Blockchain investors.

**USA**
Different states and entities within the US have different regulatory positions. SEC, for example, classifies most tokens and virtual currencies as securities. The IRS classifies cryptocurrencies as property for tax purposes.

**UAE**
Pioneers in adoption of Blockchain in public sector, UAE has adopted an enabling regulatory stance; legal treatment varies broadly on where the entities are located.




**South Korea**
Revised its initial hostile regulatory stance towards ICOs and VCs; ban on ICOs has been lifted and recognizes VCs as a form of legal remittance.

**Singapore**
Considered the Asian blockchain hub, it has developed a business- and investor-friendly regulatory approach towards blockchain.

**Australia**
Regulatory approach that places more emphasis on technology development and less regulatory interventionism; has one of the most extensive cryptocurrency tax regimes in the world.

Source: Avasant 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.

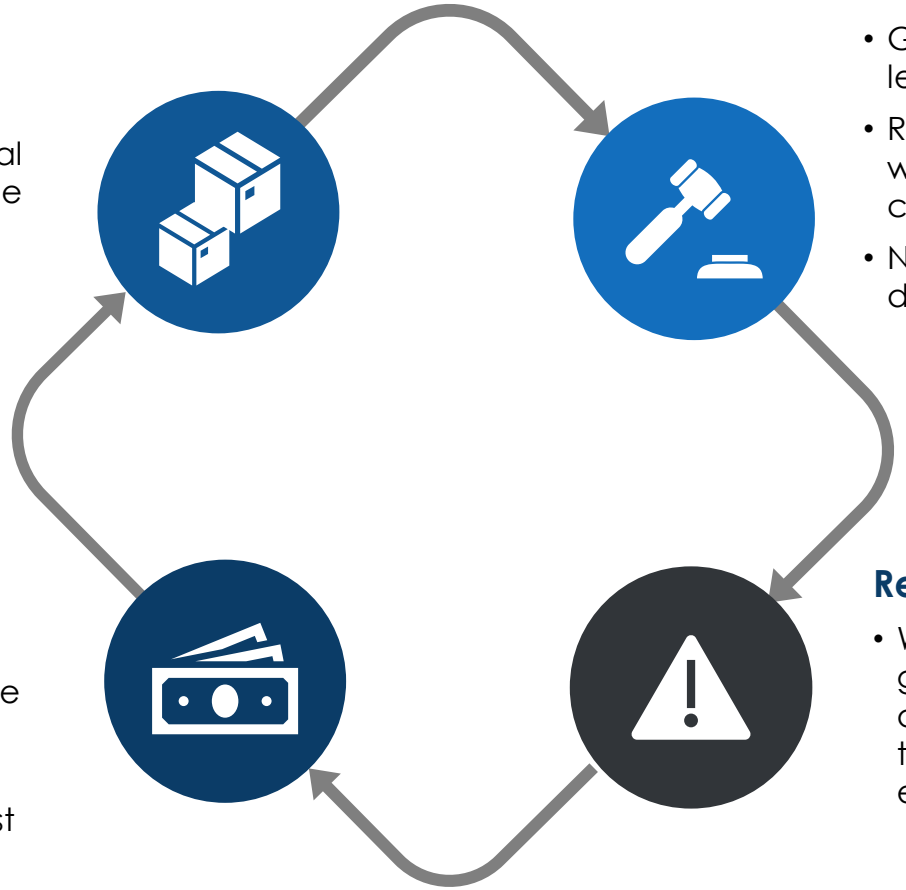
# Consequently, India is still in the process of providing a firm regulatory direction to the Blockchain ecosystem

### Favorable towards Blockchain

- While the government of India (GOI) has taken a critical view of VCs, it has a favorable view of Blockchain technology and is looking to introduce a national digital currency and identify other areas where the technology can be applied to solve problems in the BFSI sector.

### Hawkish on Cryptocurrencies

- GOI does not recognize cryptocurrencies as legal tender.
- RBI has cautioned the public against dealing with VCs and has closed all formal banking channels to entities dealing with VCs.
- No explicit legal framework around ICOs or digital tokens/crypto-assets.



### BFSI-Centric Approach

- GOI regulatory approach towards Blockchain has been largely focused on the application of the technology in the BFSI sector.
- The Reserve Bank of India (RBI) has led most of the regulatory directives around Blockchain in India.

### Restriction on Crypto Exchanges

- While there is no formal regulatory framework governing crypto exchanges, preventing access to formal banking channels has led to the shutdown of prominent crypto exchanges in India.

# A consultative and enabling regulatory approach towards Blockchain can help drive the growth of the Blockchain ecosystem and innovation in India

> *There is **need for positive signaling** from the Government of India, and efforts to drive the growth of the Blockchain ecosystem in India through provision of timely and well-defined regulatory guidance*

**Proactive, Consultative Approach**

India needs to act fast and work consultatively with the key stakeholders in the crypto/blockchain community and provide regulatory certainty and clarity around blockchain technology (specifically around cryptocurrencies and digital tokens).

**Blockchain Working Group or Self-Regulatory Body**

A blockchain working group (similar to the Dutch Blockchain Coalition) or a self-regulatory body (similar to the one in Japan) can help drive the development of regulations or standards required for the growth of the overall ecosystem in India.


**Regulatory Sandbox**

A blockchain regulatory sandbox could also help drive product innovation in the country and also signal positive intent to the blockchain start-up/developer community, while protecting investor and consumer interests.

# Innovative Indian start-ups have emerged to address key issues across different industries

> They are offering solutions to key industry problems across Healthcare, Public Sector, HR, Retail and CPG, BFSI and Technology (crypto wallets etc.), Media and Telecom sectors.

## Technology

- Token trading
- Identity Verification
- Decentralized exchanges
- Loyalty programs
- IP management
- Micro-corporations management
- Micropayments
- Crime reporting
- Media IP protection
- Privacy control

## Healthcare

- Insurance and medical loan
- Medical record maintenance
- Medicine supply chain
- Elimination of fake drugs
- Secured healthcare data sharing

## BFSI

- Faster and cheaper remittances
- Authentication, verification and storage of electronic records
- Secure digital compliance
- Vendor management
- Efficient supply chain trade finance
- KYC norms
- Digital onboarding solutions

## Government

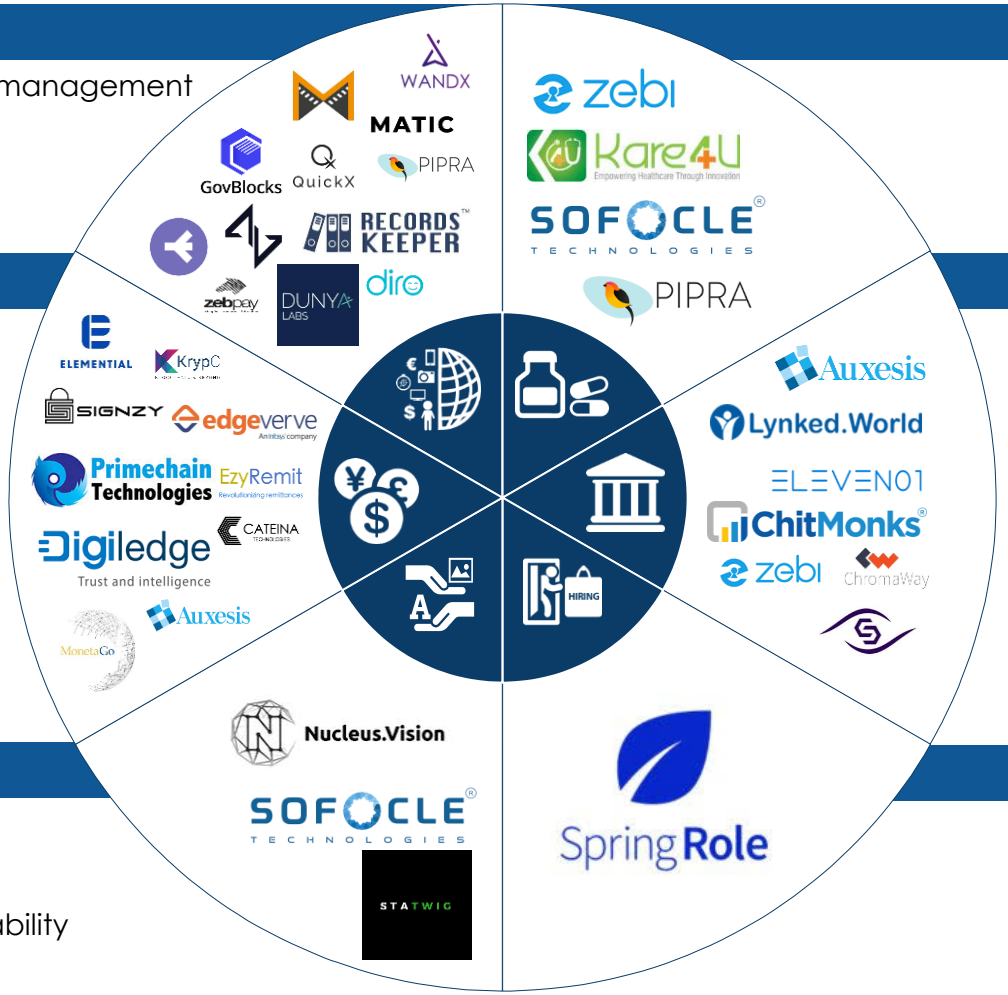
- Organ tracking for transplantation
- Rationing management
- Vehicle title management
- Sapling management and monitoring
- Chit fund operations administration
- Identity management
- Digital certificates management
- Land registry management
- Citizen electronic Health record
- Agricultural supply chain

## Retail and CPG

- Brand engagement
- Privacy control
- Loyalty programs
- Anti-counterfeiting
- Food auditing
- Loyalty programs
- Procurement optimization
- Supply chain traceability
- Inventory control

## Human Resource Management

- Employment verification
- Candidate recruitment




Source: Avasant Analysis and Research

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# However, the Blockchain start-up ecosystem in India has not taken off as fast as it has globally

*India-based entrepreneurs and start-ups are establishing operations in jurisdictions such as Malta, Singapore, Switzerland, UK, etc. to limit their exposure to regulatory risk associated with the use of digital tokens or assets in India.*

**0.2%** While global VC investments on Blockchain start-ups has reached USD 5.6B to date, India has been able to attract only a small fraction (0.2%) of those investments.

**~2%** India accounts for only about 2% of all Blockchain start-ups worldwide.

- Global demand for Blockchain solutions is very high which presents major opportunity for Indian start-ups, but there are only a handful of them. There is headroom for more start-ups to emerge and offer industry-specific solutions.
- The current regulatory environment has been restrictive for the growth of the Blockchain start-up ecosystem in India.

Source: Avasant Analysis and Research

# There is significant opportunities for Indian Service Providers to expedite the Blockchain adoption in India

*Given the global reach and experience in large-scale solution deployments, service providers in India can take the lead in driving the growth of the Blockchain ecosystem in the country.*

- Majority of the mid and large service providers in India have a low portfolio of Blockchain projects in India (<5%) vis-à-vis their projects in other geographies (especially North America and Europe).
- However, these service providers have been involved in various blockchain solution initiatives in sectors such as BFSI, Public Sector, Telecommunications, Healthcare, Retail, Utilities, etc.
- Service providers in India are also actively collaborating with Blockchain start-ups to jointly develop enterprise solutions using different engagement models such as co-investment and co-innovation.
- Service providers are also working with regulators and public sector agencies, advising them on industry-wide standards and technical solutions that could be developed for sectors such as Telecommunications, BFSI, Food & Safety, etc.

Source: Avasant Analysis and Research

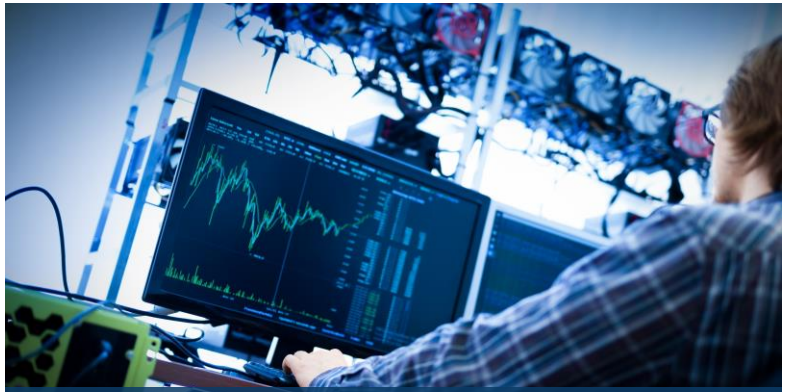
# Indian Service Providers need to invest in building their capabilities to capitalize on the opportunities in the domestic and global Blockchain markets

## Invest in Patents and IP

- Global service providers are investing more in blockchain R&D and are filing a larger number of Blockchain patents compared to Indian providers.
- IBM and Accenture together have filed 50+ patents in US, which is more than the blockchain-related patents of all Indian service providers put together.

## Expand Blockchain Services Offering

- Indian service providers are leading their blockchain solution delivery with existing clients and in their core sector(s) of expertise.
- There is a need for Indian service providers to expand their capabilities by implementing a diverse set of use cases across all major sectors.



## Strengthen Blockchain Talent Development

- There is a shortage of skilled blockchain talent in India, and the overall Blockchain ecosystem is yet to address the problem effectively.
- Service providers can take the lead in designing and running blockchain training programs at scale, both on their own and through collaborations with academic institutions.

Source: Avasant Analysis and Research, Avasant Blockchain Services RadarView 2018

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