



## DIGITAL TRANSFORMATION - ADVANCEMENTS IN APPLICATIONS OF BLOCKCHAIN TECHNOLOGY THE EVOLVING POWERHOUSE OF INDUSTRY 4.0



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### Introduction

The idea for processing transactions in a cryptographically secured chain of blocks was first revealed in 1991 by computer scientists Stuart Haber and W. S. Stornetta. Their objective was to ensure data privacy, security, and integrity. Nick Szabo, a legal scholar, and specialist cryptographer researched on introduction of digital money and ideated 'Bit Gold' in 1998 using a Blockchain platform. This was further advanced by Stefan Konst. He published improved research papers

on applications of cryptographically secured chains and their implementation for designing solutions.

In 2008, when subprime mortgage crisis in USA and its aftershocks were tormenting the world, came the path breaking contribution of Satoshi Nakamoto, albeit controversies about identity remaining unresolved. The objective was to liberate money from regulatory controls by introducing Bitcoin through a peer-to-peer network created with Distributed Ledger Technology (DLT), synonymously known as Blockchain.

Vitalik Buterin liberated

Blockchain from the castled domain of cryptocurrency. He proved that private blockchain platforms would be efficient and effective for handling many more commercial transactions. Buterin, one of the co-founders of Ethereum and contributors to Bitcoin codebase, unveiled in 2015 the second platform called Ethereum. He designed it with the embedded facility of a Smart Contract to ensure legal and regulatory compliances of transactional agreements for commercial purpose. Technology giants like Microsoft, BBVA and UBS, could foresee vast business potentials of Blockchain because of its foundational

abilities, and speed to disrupt legacy systems. All these saw the advent of a new technological renaissance in Industry 4.0 era.

Readers may find several articles<sup>1-4</sup> of this author on fundamental features and applications of Blockchain technology for creating driving platforms, integrated with simultaneous applications of other seven other deep technologies, in his personal website [www.innovationians.com](http://www.innovationians.com). A video recorded presentation is also available in his YouTube Channel<sup>5</sup> (from 6.00 minute) along with many other sessions on digital transformation as are hosted there.

## Objective

Since writing of those articles, Blockchain technology has advanced with accelerated pace towards becoming

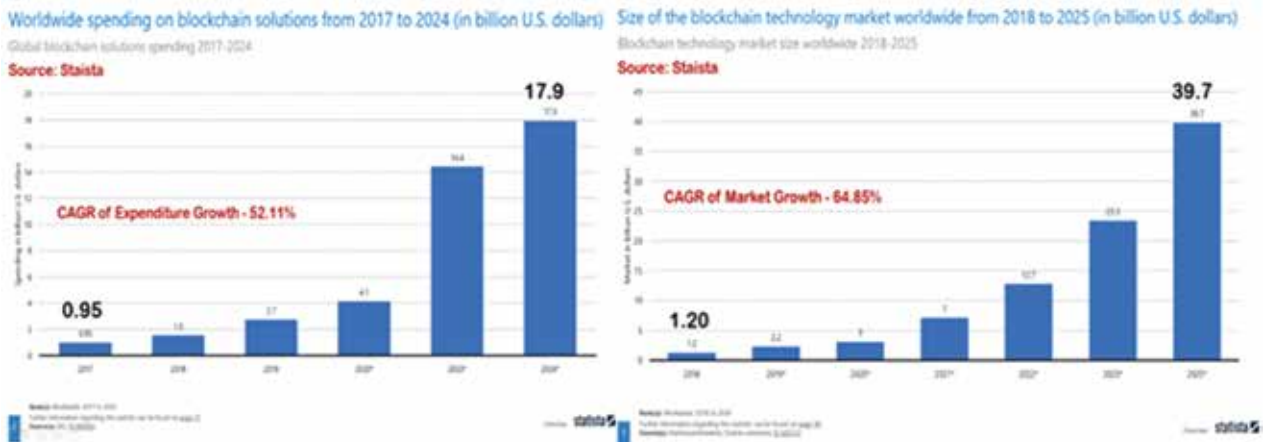
the Powerhouse of Industry 4.0 and opened new vistas for multipurpose applications. Dreadful impacts of Covid-19 Pandemic on business and life of all under the sun have also speeded up the pace of digital transformation with applications of Blockchain. Therefore, objectives of this 18th article, in a row under this monthly column, are to add knowledge about the enormity of spending for and expansion of worldwide market for developing Blockchain based solutions. What and how CXOs around the world are sensing and projecting benefits from advanced applications of DLT will be shared. Certain unique applications of Blockchain will also be added at the end

Reader will be able to gather how digital solutions are being designed to derive benefits from foundational

capabilities of Blockchain platforms for rendering multifarious services from one platform transcending sovereign borders. One of the cases in point for this is the article of this author in which he has ideated Kisan Blockchain Platform<sup>2</sup>.

## Enormity of Growth in Expenditure and Market

The following is a set of two vital information from the globally reputed firm Statista<sup>6</sup> with projections till 2025. These delineate the enormity of expenditure for designing digital solutions with blockchain technology, at what pace its global market is expanding since 2017 and estimated to expand till 2025.



Source: <https://www.statista.com/topics/5122/blockchain/>

The graphical report has been presented through for ease of developing observations and drawing inferences at global level:

Description of Data	2017 / 2018	2020	2024 / 2025
Expenditure for Blockchain solutions (USD Bln.)	0.95	4.10	17.90
CAGR of spending from 2017		62.8%	52.1%
CAGR of spending from 2020 to 2024			44.5%
Size of Blockchain Technology Market (USD)	1.20	3.00	39.70
CAGR of market volume from 2018		58.1%	64.8%
CAGR of market volume from 2020 to 2025			67.6%

Albeit a slow starter for commercial applications since 2015, Blockchain as a digital technology has picked up acceleration with quantum leap both in terms of spending and market growth, particularly since 2017. Readers must have realised the enormity of

applications that are being done by digital scientists for designing solutions with the help of DLT.

An understanding about the above for India can be drawn from the report of 'businesswire'<sup>7</sup> in its report published on September 17, 2019. It

stated that "Blockchain spend in India has increased at 103.4% during 2018 to reach US\$ 154.8 million. Over the forecast period (2019-2025), spend on blockchain is expected to record a CAGR of 47.3%, increasing from US\$ 289 million in 2019 to reach US\$

4,348.3 million by 2025.” One can, therefore, infer that seeing the actual pace of growth in past two years and from the perspective of projection till 2025 applications of Blockchain technology will continue to expand in India also with an accelerated pace.

There are reasons to be more optimistic in India from the recent news item that the Lower House of the Indian Parliament is expected to consider a bill during current winter session of 2021. In this Law provisions will be kept for introduction of digital currency and promotion of Blockchain. According to the Indian Express<sup>8</sup>, “The proposed law will provide a framework for the creation of an official digital currency to be issued by the Reserve Bank of India and allow certain exceptions to

*promote blockchain, the underlying technology of cryptocurrency and its uses, according to a bulletin of the lower house of parliament.”*

### Relevance, Business Objectives and Priority

Capgemini Research Institute conducted a survey in 2017<sup>9</sup> among 447 corporate executives across the world on the path of Blockchain from awareness to maturity and business relevance of Digital Transformation with Blockchain. Based on the responses Capgemini segmented the period into three waves:

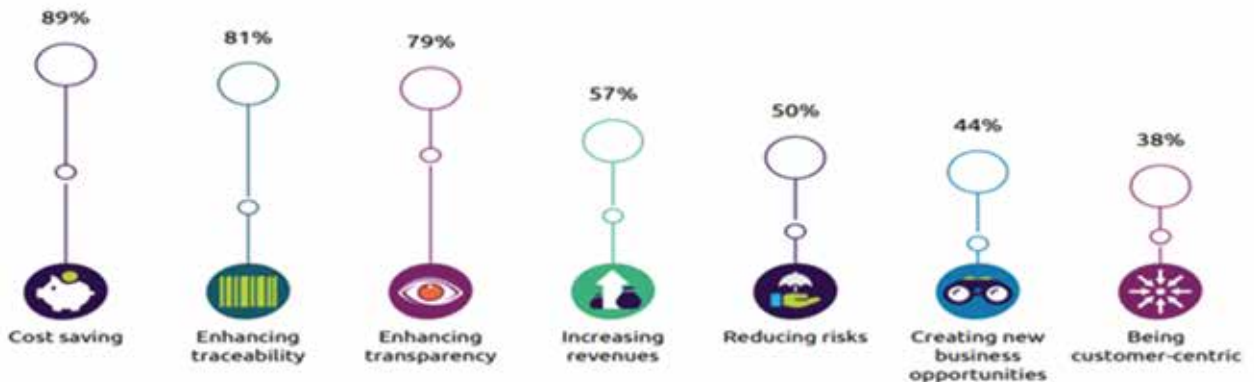
- ⊙ Wave I : Awareness - 2011 to 2018
- ⊙ Wave II : Experimentation

- 2017 to 2020

- ⊙ Wave III : Digital Transformation - 2019 to 2025

On hindsight one can perceive that the then prediction is almost coming to reality. This survey result can also be corroborated using the aforesaid financial numbers of Statista regarding expenditure in applications and growth of market for Blockchain technology.

Business managers would be happy to note the following statistical numbers drawn by Capgemini from the replies of those 447 survey respondents about the drivers and their graded importance for investing money in designing solutions with blockchain technology. The respondents had more than one choice.



Source: Capgemini Research Institute, Blockchain Survey; April–May 2018, N=447 organizations.

Further analysis of the above data reveals the following:

- ⊙ Cost savings, enhancing traceability and transparency as drivers topped the agenda,
- ⊙ Two drivers would directly contribute profit and profitability, viz., Cost saving (89%), and Increasing revenue (57%),
- ⊙ Four drivers are market and customer centric, viz., Enhancing traceability of products (81%), Increasing revenues (57%), Creating new business opportunities (44%) and Being customer-centric (38%);

It would be pertinent here to analyse the comparative results of three consecutive global level surveys<sup>10</sup> conducted by Deloitte on the same set of mission critical business issues as well as approach and attitude of business executives towards blockchain.

Universe, Description of Priority and Relevance of Blockchain	Percentage of Respondents		
	2018	2019	2020
Survey years			
No. of total respondents	1,053	1,386	1,488
Critical as a strategic priority	43	53	55
Important but not at the top five of urgent agenda items	29	27	26
Relevant but not a strategic priority	21	14	14
Conclusion not reached about the strategic priority of Blockchain	4	3	3
Not relevant as an agenda point of business strategy	3	3	2

One can deduce from the above table with reasonable certainty that adoption and applications of blockchain technology is fast climbing up the CEO’s strategic agenda in terms of priority, importance, and relevance for adoption of blockchain technology. The same survey results of 2020 revealed certain more exciting conclusions from the perspective of business

relevance of Blockchain as a technology for digital transformation. These can be summarised in the following data points:

- ⊙ 88% of respondents mentioned that Blockchain as a technology is scalable,
- ⊙ 86% opined that there are compelling business cases for applications of Blockchain,
- ⊙ 85% of respondents mentioned that they have a plan to replace existing systems by Blockchain technology
- ⊙ 83% were of the view that competitive advantages of the business will be lost if Blockchain is not adopted

as a technology for digital transformation,

The above proportion of responses again corroborate the projections contained in the aforesaid report of Statista. They indicate the drivers which will move the market for Blockchain from USD 3.00 Bln. in 2020 to USD 39.70 Bln. in 2025. Readers will agree with this authors prophecy that if spending on blockchain technology and its market sizes grow with 44.5% and 67.6% respectively at the global level, there is no reason to believe that India fall behind. Again, such a prediction has also been indicated in the report of 'businesswire' as stated above. The report of the Indian Express adds more

to silver lines

## Blockchain for Controlling and Monitoring of Pandemic

In the context of Covid-19 Pandemic zillions of bites have been used in cyberspace for driving the fact that Blockchain, AI & ML and six other deep digital technologies can be integrated for monitoring and controlling of pandemic and comorbidities. This in tun would and is also bringing efficient and effective solutions for reducing sufferings and sad demises of people of all levels of society across the world. This author has written one such article<sup>3</sup> on digital transformation of health care services.



**Source:** <https://www.bbvaopenmind.com/en/technology/digital-world/blockchain-technology-and-covid-19/>

Prof. Ahmed Banafa of San Jose University, USA has concluded that<sup>11</sup> *“A blockchain is an essential tool for establishing an efficient and transparent healthcare business model based on higher degrees of accuracy and trust because technology is a tamper-proof public ledger. .... what it can do is create the first line of rapid protection through a network of connected devices whose primary goal is to remain alert about disease outbreaks. Therefore, the use of blockchain-enabled platforms can help prevent these pandemics by enabling early detection of epidemics, fast-tracking drug trials, and impact management of outbreaks and treatment. .... Blockchain could also manage crisis situation. It could instantly alert the public about the Coronavirus by global institutes like the World Health Organization (WHO) using smart contracts concept.”*

## Recent Unique Applications

It will not be possible to make a comprehensive list of reported unique applications of Blockchain technology during last about two years due to limitations of pages allotted for this article and ability of the author to hold on to readers' patience. However, and attempt has been made to list a few unique applications in the following segments:

- ⊙ **Digital identity for motor vehicles:** Mobile Open Blockchain Initiative (MOBI), a consortium of automobile majors like Honda and Ford has initiated the first of its kind Blockchain operated systems for providing standard digital identify to new vehicles. This solution would be able to monitor, track and report various prelisted types of incidents during a vehicles

operating life. More uniquely the solution can be used for bringing those monitored vehicles in a chain link for communicating material information, keeping surveillance on speed, geographical route of movement and position, intensities of braking and even driver's behaviour like cutting of lanes, etc. Such facilities will also help insurance companies

- ⊙ **Automation of middle office functions for PE Funds:** Northern Trust, a financial services entity has designed a blockchain based software for Broadridge, New York. That software can handle and control on an end-to-end basis investment activity by private equity funds. Their manual middle office functions,

viz., handling agreements, rationalising the process of data accumulation, and communicating with investors, etc have been automated. Broadridge will soon commence executing bilateral repurchase agreements (Repos) making use of the blockchain platform.

## ⊙ **Nine Blockchain Projects of China Bank**

This second largest bank of the world has the following blockchain based projects in operation for commercial applications. Certain major objectives for such projects are:

- ⊙ Monitoring and tracing pharmaceutical products to their origin of manufacturing,
- ⊙ Monitoring and tracking carbon credits for less polluting industrial units,
- ⊙ Monitoring and tracking how government grants are being spent, and
- ⊙ Connecting sixty financial institutions, including Postal Savings Bank of China and The Bank of Shanghai, with circa three thousand manufacturing units and commercial entities engaged in inbound and outbound trading of goods. This would help an exporter at times of sufferings from liquidity crunch, while waiting for a shipment to be established, can borrow within a few minutes by submitting documentary evidences in support of confined receivables.

- ⊙ **Equity Swap and Derivative Transactions:** Citi Bank, Goldman Sachs and thirteen trading firms have collaborated for automating the process for pairing and reconciling and settlement of derivative contracts using Axoni's Axcure blockchain. This digital transformation with blockchain platform will minimise mistakes, processing costs and disputes over valuation of underlying assets. Global

securities warehouse DTCC will soon move its \$10 trillion credit derivatives business to a blockchain.

## ⊙ **Smart Contracts for Musicians**

Mediachain of New York has started using smart contracts embedded in a Blockchain Platform for ensuring that musicians get their deserving share of money by entering a decentralized, transparent smart contract. It helps them by ensuring that they get higher royalties and full payment when it is due.

## ⊙ **Cybersecurity for IoTs**

A Blockchain platform can function as a convergence point for receiving, distributing, and monitoring of data and information received from IoTs in a peer-to-peer network with assurance of security, safety, pace, and transparency. HYPR impedes exposures of IoTs to risks caused by cybercriminals with the help of its decentralized credential management solutions. IoTs virtually made unhackable. All these in turn will help in proliferation of edge computing, further bring down costs and enhance speed.

Xage of California operates the world's first blockchain-enabled cybersecurity platform for IoT companies. Billions of IoT devices are digitally managed and monitored at any given point of time. It can *suo moto* diagnose and mend in any unlikely event of breaches. This software is used by IoT companies engaged with transportation, energy and manufacturing industries.

The list can continue to run in almost unending manner, but the author will have to stop somewhere due to shortage of space.

## **Conclusion**

Digital scientists are steadily moving ahead with innovative and agile solutions built using Blockchain technology. Their objective is to handle multifarious business processes, which are complex, risks prone, cost and

time inefficient when handled using legacy systems with avoidable human interventions. Through the above discourse an effort has been made to sense and appreciate the immensity of such work being done. Instances of success in application of DLT, which are gaining further momentum every day, are enabling the technology to climb up and find place at top three CEO's agenda in large and medium companies all around the world.

In a separate article further attempts will be made to understand digital transformation of day-to-day administration processes and delivery of services to citizens by governmental organisations and NGOs. Meanwhile the author's fervent appeal to all commercial organisations to please share the monetary benefits being derived through such digital transformation with all direct and indirect stakeholders for inclusive smile. **MA**

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