



# DIGITAL TRANSFORMATION OF BANKING AND SERVICE DELIVERY PLATFORMS WITH BLOCKCHAIN TECHNOLOGY



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## Synopsis

*The clarion call of Industry 4.0 for banks is to implement digitally transformed processes to attain competitive advantages, risk management, and provide delightful digital experiences to stakeholders. Globally Blockchain technology has proved to be one of the enablers for achieving*

*such objectives with the ultimate aim of shared value creation and inclusive finance. This paper deals with the major multifaceted dimensions of banks making strategic decisions for adopting and applying Blockchain befitting the internal and external realities of their respective business ecosystems. The author has also dared to write a couple of thoughts for garlanding the global banking systems with this powerful technology.*

## Acknowledgment

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*Image Source:* <https://cointelegraph.com/news/china-banking-body-to-develop-multi-use-blockchain-platform-with-major-banks>

## Introduction

Last month's paper on Neo Banks<sup>1</sup> may lead many knowledge seekers to further study features, adoption, and applications of Blockchain technology from the perspectives of a bank's both internal and external stakeholders. Any traditional bank can adopt any one or both approaches towards neo banking, viz., wrapping up legacy operations with integrated digital technology-driven services provided by unlicensed external partners. Or develop their own digitalised systems to render new and unique services going beyond the boundaries of traditional policies, and SOPs.

The author's study of global use cases reveals that applications of Blockchain technology are effective enablers for digital transformation of banking operations with new and unique businesses and revenue models. Moreover, its applications can speed up many traditional banking operations with transparency, cost-effectiveness, immutability, and enhanced security. Thus, it can attain and enhance capabilities for rendering neo banking services.

The theme of the author's 21<sup>st</sup> Paper<sup>2</sup> was interplay of strategies and technologies for customers' delight in banking industry. Two more Papers<sup>3&4</sup> have been written on emerging dimensions of Blockchain technology and Smart Contracts<sup>5</sup> and their applications. Due to shortage of space, it will not be possible to repeat those aspects in this paper. Readers, if need be, may please refer to those papers to gather more about various dimensions of Blockchain, which is synonymously known as Distributed Ledger Technology (DLT), Smart Contracts, etc. for better understanding of the present paper.

## Objective

The predominant objective of this paper is to deal with the multifaceted major dimensions of decision-making for adoption and applications of Blockchain technology by traditional banks for digitalisation, digital transformation of operations, and adding new/unique services to stakeholders. The paper will also narrate several illustrative applications of Blockchain by large banks for attaining competitive advantages, cost effectiveness, and providing delightful experiences to customers. Certain thoughts have also been included to remove the barriers in adoption of Blockchain by banks across the world.

## Major Features of Blockchain from Bankers' Perspectives

Blockchain technology-based platforms (BTPs) are predominantly driven and auto-governed by digitally

scripted Smart Contracts (SCs) embedded into BTPs. Such SCs facilitate conducting intended transactions by and between participants. All activities through BTPs are transparently performed in strict compliance with all applicable provisions of laws, regulations, taxation, global commercial codes like Incoterms for export-import, accounting standards, etc. The related provisions are scripted in the SCs for compliance and popup alerts. Such BTPs, powered and driven by SCs, have stood the test of time through real-time running of hundreds of globally implemented use cases. Digitalised processes with Blockchain can be designed and implemented in the following three network environments:

- ⊙ **Public Network** - Wide open for participation by all in say issue of bonds by banks and subsequent trading,
- ⊙ **Restricted or Hybrid Network** - Entities and their authorised participants dealing with the intended transactions only can join e. g., for settlement forex transactions inter se, and
- ⊙ **Enterprise or Self Blockchain** - Such BTPs are created within an organisation for specific purposes, e.g., safe storage and handling of title documents by a bank for freehold and leasehold real estate properties, rented premises, and other important documents.

However, access and functional rights for all types of BTPs are granted only on a need-to-work basis after completion of 'Know your Participant' (KYP) process duly evidenced by prescribed documents. A participant can be an individual or the authorised representative of any organisation. In this KYP process, the system generally uses:

- ⊙ **AI-powered 'Optical Character Recognition Tool (OCRT)** - To avoid human intervention while filling up credentials and other details in the soft copy of forms, etc.
- ⊙ **Auto verification of authenticity of supporting documents** - By digitally enquiring into the issuing authority's platform, e. g. UIDAI for an Aadhaar Card, or the Income Tax Department for PAN in India.

Blockchain-based solutions are built with the assumption of **No Trust** assuming that none of the participants can be trusted. The solution per design ensures that all transactions are conducted with total transparency and in cent percent compliance with all legal and regulatory requirements. Thus, Blockchain ensures establishment of only one version of truth for

any transaction. All transactions are immutable and cannot be changed without initiating another transaction for correction, if need be, and consented by the affected party(ies). Such a concept is critically important in the

contemporary global and domestic business ecosystem, plagued with ever-increasing numbers of frauds and litigations.



Source of image: <https://www.facebook.com/HandsTogetherUs/>. Texts are inserted by the author.

All BTPs are operated by each participant with two keys auto generated and encrypted by the system. Each authorised participant enters the platform with her/his 'Private Key'. However, the BTP displays the participant's 'Public Key' while announcing related transactions to maintain privacy. The following are some of the major features of Blockchain technology:

1. Internet-based platform for initiating and completing P2P and E2E transactions,
2. Embedded Smart Contract with pre-provisioned compliance requirements,
3. Decentralised Data Storage Mechanism (DDSM) with Decentralised Ledger (DL) for each participant. Each of the participant's computing nodes can store all transactional records and documents of all participants. The present generation of BTPs can store those in an encrypted centralised library with wallets for each participant sent to their respective nodes.
4. Transparency with pseudonymity is ensured with Public Key,
5. No need for any Central Authority to maintain master and transaction data, if so designed,
6. All transactions are encrypted with complex algorithms that can dynamically be changed,
7. Every transaction is authenticated by one or more nodes other than the initiator,
8. An authenticated transaction data is pooled into the chain of blocks of transactions,
9. Each block is encrypted with a cryptographed

hash function and can't be changed,

10. Programmed with cryptographed computational logic and algorithmic rules,
11. All transactions and stored documents can easily be retrieved,
12. BTPs can be upgraded with a Zero Knowledge Proof (ZKP) algorithm to establish the truthfulness of any transaction without disclosing any information, and
13. Cryptographed DDSM renders the system almost non-hackable,
14. A layer of tools crafted using AI, ML, DL, and BDA can be added on top of any BTP for conducting analyses and drawing insights from data, generated by the system and related documentation.

The above features establish confidence and comfort amongst all users. The technology and solution design proactively takes care of several risks and turns the solution into a great enabler for Risk Enabled Performance Management (REPM).

### Adoption of Blockchain Technology by Bank

Besides many tangible and intangible benefits, Blockchain is a resourceful technology for cost savings. However, it should not indiscriminately be adopted by any entity. Considering the above features of Blockchain and BPTs the author suggests the following set of questions that must be answered before deciding on its



adoption. Understanding the business and facts-driven answers to these questions would help make the right decision for adopting Blockchain technology and BTP by

all organisations irrespective of nature, and particularly by banks:

| Questions Before Adopting Blockchain Technology Solutions                              | Answer and Adoption Decision |                       |
|--|------------------------------|-----------------------|
| 1. Will there be a <b>Large No. of Participants</b> from business ecosystems?          | Yes                          | Adopt                 |
| 2. Is the establishment of <b>Trust</b> between parties of critical importance?        | Yes                          | Adopt                 |
| 3. Are all the parties and the existing tech-based systems <b>trustworthy</b> ?        | Yes                          | Do not adopt          |
| 4. Is it critical to <b>Record &amp; Retain</b> transaction details and documents?     | No                           | Do not adopt          |
| 5. Are <b>Authentic identity</b> of all parties and <b>Fraud Prevention</b> essential? | Yes                          | Adopt                 |
| 6. Are <b>Transparency</b> and <b>Irreversibility</b> of transactions essential?       | No                           | Do not adopt          |
| 7. Do you need the <b>Database</b> and an attached <b>AI Layer</b> for analyses?       | No                           | Do not adopt          |
| 8. Does the database and transactional system need <b>Shared Writing</b> ?             | No                           | Do not adopt          |
| 9. Are <b>Control Functions</b> and <b>Statutory Compliances</b> essential?            | Yes                          | Adopt                 |
| 10. Are <b>Provenance, Immutability, and Data Governance</b> critical?                 | Yes                          | Adopt                 |
| 11. Are transactions to be also conducted by the <b>Public</b> after KYC is done?      | Yes                          | Public Blockchain     |
| 12. Are transactions to be performed by restricted <b>Interfirm</b> parties?           | Yes                          | Restricted Blockchain |
| 13. Are transactions to be performed only by <b>Intrafirm</b> participants?            | Yes                          | Enterprise Blockchain |

If the answer to any question, listed under serial numbers 1-10 above, is the reverse of Yes or No, the decision will also be the reverse of what is given against each question. The decision for adoption would also depend on availability of skilled manpower, and affordability of the entity based on a cost-benefit analysis for launching and running the BTP. However, such expenses can, if so decided, suitably be recovered from participants, particularly when Blockchain is provided as a Service (BaaS)

Banks and FinTech entities, as the axiom says, can survive only on the foundation of trust. In the contemporary world with overwhelming developments and applications of digital technologies banks can always establish and maintain trust and truthfulness by applications of Blockchain. Research scholar R. K. Jena (2022)<sup>6</sup> through his work using empirical data, concluded that “... *facilitating conditions, performance expectancy, and initial trust, are the significant antecedents to predicting the bankers’ intention to use Blockchain in banking transactions. The study also established the significant mediating role of initial trust in predicting usage intention to use Blockchain.*”

### Significance of Blockchain for Banking Industry

Global netizens have started believing the statement of Bill Gates, “Banking is necessary, banks are not.” Therefore, both digitalisation and digital transformation for crafting new and unique business and revenue models are pressing necessities for gaining competitive advantages and avoiding physical contact with

customers. The above narratives on major features establish that Blockchain is one of the most dependable digital technologies for multiple applications by banks with reduced human interventions.

Hisam O Mbaidin (2023)<sup>7</sup> et al in their cerebral research work on applications of Blockchain for banking sector have concluded that “*Implantation of smart contracts, risk management, risk mitigation and faster payment are the opportunities for the banking sectors of developing countries to increase trust and transparency in their financial systems as well as formalization of their economy. .... upon the adoption of Blockchain technologies, there will be ease in financial transactions and transfers of money for financial institutions.*”

While commenting on the use and impact of Blockchain in banking industry DBS Bank in two of its publications<sup>8A&B</sup> has mentioned that. “*Traditional banking systems require intermediaries such as clearinghouses, custodians, and other third-party service providers, .... However, with Blockchain technology, these intermediaries can be reduced, allowing for faster and more cost-effective transactions. This increased efficiency can lead to significant cost savings for banks and their customers. .... Blockchain technology has the potential to transform the banking industry by providing increased security, efficiency, and cost savings.*”

*Beyond digital assets, another key innovation that this technology has enabled is Decentralised Finance (DeFi), where tokenisation and the use of smart contracts allow peer-to-peer financial transactions without the need for intermediaries, based on self-governance by the DeFi*

community.” The following data published in May 2022 by the Research Department of Statista, a global statistical organisation of eminence, reveals the actual

and projected Blockchain market size for banking and financial services business from 2019 to 2026:

**Blockchain use in banking and financial services market size worldwide in 2018 and 2019 with a forecast to 2026**



Source: <https://www.statista.com/statistics/1229290/Blockchain-in-banking-and-financial-services-market-size/>

The above statistics portray that continuous growth in adoption of Blockchain by banking and financial services sector promises all potential for the market size to increase from USD 0.28 Billion in 2018 to USD 22.46 billion with a CAGR of 72.99%. Such a growth potential indicates the versatile capabilities of Blockchain technology and its usefulness for the global banking industry.

should not be construed that only the named banks use it. Again, some of such applications have uniquely been developed by certain banks or their technology partners/associate startups which have still not been widely adopted by others.

**Applications of Blockchain for Banking Operations and Services**

**Blockchain for Banking Operations and Service**

The previous two sections convincingly establish that Blockchain and BTPs are appropriately suitable for and can help meet the expectations of different stakeholders of any bank. They resort to applications of Blockchain or DLT for various internal and external stakeholder-centric activities as have illustratively and briefly been stated below. Names of the concerned banks for certain use cases have been stated as examples. However, it

It would be pertinent to start with **Data Governance**. It is of critical importance from the perspective of all stakeholders, data protection, privacy, and related compliances with all statutory provisions. Moreover, data is the new digital gold of the ongoing Industry 4.0 era. The AI Layer with multivarious tools, attached to any BTP, can facilitate deep drive data analytics which can help make strategic decisions and initiate new business and revenue models. The following graphics of PwC would help understand the subject better and reduce narratives.



Source: <https://www.pwc.in/industries/financial-services/fintech/point-of-view/financial-services-data-and-analytics/september-22.html>

PwC has affirmed that Blockchain helps governance of data comprising Metadata, Transactional Data, Master Data, Data Quality, and Data Protection. The narratives in the above graphics also confirm the other features and advantages that can be derived by applications of Blockchain which are extremely relevant and essential for various facets of data governance. The following are some of the other applications of Blockchain for internal activities:

- ⊙ Valuable Document Management: Digitally preserve and handle valuable documents for freehold moveable and immovable properties, leasehold and rented premises, other valuable assets, agreements with third parties other than customers,
- ⊙ Liquidity Management: J.P Morgan addresses liquidity mismatches in the bank's loan funds,
- ⊙ Systems Access Control: A Blockchain-based process can control and monitor all accesses to all systems and reduce many maladies stemming from unauthorised accesses and duration.

### Services to Customers and Other External Stakeholders

- ⊙ KYC Process and Fraud Prevention: OCBC bank uses BTP for conducting, authentication, and onboarding customers/other users before commencing service delivery. IBM has developed a common platform for KYC which all banks can use by establishing interoperability,
- ⊙ Custodial Services for Virtual Digital Assets: Swedish Central Bank and HSBC use specially designed BTPs as a digital vault for storing virtual digital assets,
- ⊙ Issuance, Monitoring and Closure of BG, L/C, and Letter of Comfort: This is another useful application by many banks around the world.
- ⊙ Cross-border Payments: Santander uses a Blockchain-based system for cross-border payments,
- ⊙ Issue of Bonds and Other Financial Instruments: This is a very common application.
- ⊙ Tokenisation of Securities: The capability of BTPs to tokenise securities and ownership management thereof helps bankers render neo banking services to customers.

### Inter Bank Services

- ⊙ Trade Finance: Fifteen Indian Banks initiated actions to start a Blockchain platform for trade

finance transactions by replacing the existing paper-heavy legacy process of foreign trade transactions and financing thereof,

- ⊙ Confirmation of Beneficiary Bank Information: BTPs are being used by J.P. Morgan<sup>SM</sup> and its partner banks, including banks of Taiwan for this important function.
- ⊙ Forex Transactions: The use of BTPs for conducting forex transactions, reconciliation, and periodical settlement is a common application across foreign banks.
- ⊙ Loan Syndication: BTPs are used for syndication of loans when one bank alone cannot or does not want to undertake any customer's entire requirement, etc.

### Central Bank Digital Currencies (CBDC):

Globally central banks of most countries, that have launched or working on pilot projects for launching CBDC, including India, use Blockchain platforms for both retail and wholesale CBDCs for individual and inter-bank transactions respectively.

The above is an illustrative and not comprehensive list of applications of Blockchain or DLT. Related information has been gathered from various publications<sup>9A-9E</sup>, references of which have been provided below for readers to gather more knowledge.

### Hurdles in Applications of Blockchain Technology

Banks across the world mostly implement digitally transformed processes with reduced human interventions. Any bank's objective must be fraud prevention and delivering outstanding digital experiences to all stakeholders, besides speed of delivery and cost reduction. The pertinent question is, therefore, that despite so many advantages, why Blockchain technology has so far not been adopted by all banks across the world?

It is an established position that, unlike AI and RPA, the speed of adopting Blockchain is relatively slow. This is predominantly because of fear of the unknown, gaps in understanding, mistrust, and absence of a globally acceptable code of standards. There is not even a globally acclaimed multilateral agency to work for sensitisation of one and all about the multifarious utilities of this powerful technology and spreading application-oriented knowledge to popularise it. Banks have started adopting this technology by observing the competitive advantages and benefits that are being derived by their large courageous counterparts who have moved the first step forward.

Besides these, the following are some of the major reasons for slower adoption and application of Blockchain technology by banks.

- ⊙ Shortage of knowledgeable and trained technologists for building Blockchain-based solutions befitting the requirements, policies, specifications, and business realities of each bank,
- ⊙ Making the right strategic decision at the right time with the right initial capital cost for launching BTPs befitting the need of the ecosystem and seamless integration thereof with the other ICT systems of the bank and concerned stakeholders.
- ⊙ Interoperability between BTPs of two or more banks is still a challenge because of compatibility issues between Smart Contracts and scripted software, non-availability of suitable APIs, software for which can also be encrypted,
- ⊙ CBDCs of most of the countries are yet to be launched/stabilised which are important for financial settlement remaining within the boundaries of each BTP or cross-border payments for Exim BTPs. Because of this many solution providers have issued their brand of cryptocurrency which customers have to buy or sell to complete transactions. Readers are aware of the issues related to cryptocurrencies.

### Conclusion

It is not enough for a few large banks to work with Blockchain-based systems. Proliferation of Blockchain as a foundational technology must be considered as a revolutionary movement for garlanding the entire global banking systems with this Blockchain. This will help share both resultant tangible and intangible benefits with all stakeholders and ensure inclusive finance. For this multilateral agencies and central banks of all sovereign countries must do all that are needed. Cybercriminals, equipped with the power of quantum computing, can play disastrous spoil sport for banks and their stakeholders. The author would once more reiterate his request for sovereign governments to per design vigilantly regulate and control the production, buying, selling, reselling, export, and import of quantum computers with the objective that those do not fall into the hands of hacktivists and cybercriminals. MA

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