Blockchains of Government Services; Application & Auditing Challenges

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Introduction

The traditional mode of providing services is no longer sustainable in view of rapid digitization. The digital realm has dramatically leveraged public services by bringing efficiency, effectiveness, and transparency in the governmental business processes. In the same way, Blockchain Technology offers myriads of prospects not only to commercial businesses but also to the governments where digital transformation may eliminate hurdles in dispensing public services. Since the introduction of Bitcoin, virtual currency, and one of the products of Blockchain, has reinforced the confidence of technology experts with regards to its applications specifically in financial services, healthcare, education, and e-voting. To reap the benefits of underlying technology many countries like Estonia, South Korea, Britain, Japan, China, and the USA are in process of implementing it, in a way to strengthening transparency and accountability in the public sector. The governments are also, however, faced with new challenges emerging in the domains of policy, auditing and cyber-security. Blockchains with its associated risks are reshaping and determining a new role for public auditor which necessitates a sound knowledge base and skillsets to ensure trust and confidence in the Supreme Audit institutions.

Nuts & Bolts of Blockchain

Before a profound discussion on the prospects of Blockchains, it is better to understand the principles and mechanisms on which technology is built upon. Blockchain, in simple words, is a distributed ledger with peer to peer integrated technology based on cryptographic functions. In an environment of a distributed ledger as opposed to a traditional single ledger where each user validates and authenticates through a consensus mechanism and while some specialized experts called miners may apply mathematical calculations for validity checks. The processed transactions are stored in the stream of information in the form of blocks locked with private keys thus, it is named Blockchain. This innovative technology has defining features in terms of the peer-to-peer network, data immutability, and encryption. The characteristics of the peer-to-peer network let the operations continue without interruption in case a single node failure occurred and eliminates the role of central authority. The feature of immutability ensures data integrity by accepting no trace for duplication. The technology is further classified into permissioned (private) and permissionless (public) platforms applied based on business nature.

In this digital age, many venture capitals have been investing huge funds in developing various platforms. So far there are three known platforms namely Bitcoin, Ethereum and Hyperledger. Bitcoin is a euphemism for virtual currency which is a public platform being used for internet-based payments. Ethereum has got an added advantage of Smart

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[1]Blockchain and FinTech: Basics, Applications, and Limitations at University of Hongkong : an online course (edx) attended by the author.

Contracts deployed on Blockchains whereby business firms could make transactions employing automated agreements with minimal human interaction reducing settlement times and operational errors. While Hyperledger is an advanced private platform with sophisticated encryption qualities specifically designed for private businesses.

Blockchain is a useful technology for the organizations where the customer is keenly interested in knowing the chain of custody of the products before its use. It eliminates intermediaries reducing costs involved in processing transactions like banking charges in international trade and builds direct links with buyers and sellers in an effective manner.

Applications

In the government sector, Blockchain technology can be used in managing efficient recordkeeping, making payments, processing tenders, and casting votes transparently with lesser costs. So far many countries especially Europeans have taken substantial steps in initiating pilot projects to explore the prospects of underlying technology while few countries are harvesting its fruits as a consequence of its implementation. According to research published in Oxford University at Centre for Technology & Global Affairs, Blockchain has been integrated into key government registers in Estonia which include the business registry, property registry, succession registry, and documentation of legal and official announcements underpinning various e-services in the public and private sector. As per another study, Estonians save 1400 working hours and 2% of their GDP annually through its digitized services. The Oxford University research paper also highlights the efforts of the Department of Works & Pensions, UK government to make payments utilizing distributed ledger technology which would drastically reduce the loss of public money at an astonishing level. The Authorities in Sweden have begun exploring the use of underlying by having partnerships with private firms in a way to increased transparency and efficiency of overall processes. In 2017, the Ministry of Internal Affairs and Communications, Japan released a statement that they plan to test a Blockchain-based system for processing government tenders and issuing tax payment

certificates. Within a year, Japan has switched to e-voting, seamless trade, and land and property registration using Blockchains. Similarly, the United States of America and China has been evaluating options for integrating Financial Technology (Fintech) for public services.

While Global efforts are underway weighing the benefits of Blockchain, Pakistan too needs to consider the options exploring the ways and means for automating its essential government services by using underlying technology with the same vigor and determination as it was done in the past while implementing SAP in public financial management matters.

Auditing Challenges

Subsequent implementation of Blockchain Technology especially in the public sector would require Supreme Audit Institutions (SAI) and other assurance professions to have new capacities in a way to meet the anticipated demands of users. The transformative pressures may certainly demand to have a sound understanding of innovative processes and controls for addressing the technical as well as adaptive challenges. The SAI may need to develop the knowledge base and skillsets by encouraging learning new technologies because underlying technology has the potential to impact on the traditional way of accounting and auditing. In one of the research papers published in 2017 by Deloitte UK in collaboration with CPA Canada & AICPA, the researchers foresee the massive impact of Blockchains on the traditional approach of auditing and recommend auditors to be well-conversant by working with experts to audit the complex technical risks associated with it. Following table shows transformative changes to traditional auditing approach.

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[3]Blochchains for Government Services: Design Principles, Applications, and Case Studies at Centre for Technology & Global Affairs, University of Oxford.

[4]Estonia-the digital republic secured by Blockchain(2019) by Pricewaterhousecoopers (pwc).

[5]Blockchains in Japan (page 49) by Marta Gonza'lez, Tokayo (2018) at European-Japan centre for Industrial Cooperation.

[6]Blockchain Technology and its Potential Impact on the Audit & Assurance Profession by Chartered Professional Accountants Canada (CPA) & American Institute of Certified Public Accountants (AICPA), 2017.

S.No	Traditional Auditing	Blockchains Auditing
1	**Bookkeeping:** The record is normally maintained in a single stand-alone manual or systemic ledger followed by appropriate approvals and authorizations based on accounting principles.	The record is developed through a peer-to-peer network called distributed ledgers after the validation process.
2	**Audit Evidence:** The audit evidence is easily obtained from the record which is necessarily required with attributes like Reliability, relevance, objectivity, accuracy, and verifiability in support of auditing assertions.	Extracting audit evidence may not be easy. Auditors may need CAAT, software, machine learning capabilities for its determination which may necessarily fulfill all required attributes.
3	**Central Trusted Authority:** The central trusted authority is the custodian of all databases ensuring data integrity and accessibility to its user departments. The single node failure may disrupt business continuation.	No central authority needed due to its distributed nature. Multiple nodes allow continuous business operations in case the single node fails. Auditors may need professional judgment to determine the reliability of the sample extracted from the shared network.
4	**Reporting & Accounting:** The reporting is made while adopting international accounting standards (IAS) and General Accepted Accounting Standards (GAAP).	The existing policies fail to fully address the management accounting for digital assets and liabilities. In the absence of policies, the professional judgment could be applied keeping in view the business objectives and resilience of technology sustaining business activities.
5	**Cryptographic Functions:** The minimum skills as regards to public-private keys and hash functions are required to build opinions for data confidentiality and reliability.	Besides cryptographic functions, hard-core skills like technical program language may be needed for building opinions regarding key functionalities like Smart Contracts.
6	**Regulatory/Compliance Authority:** The organizations/corporations/industries work under the regulatory framework and report compliance.	There exists no regulatory mechanism as evident from the business of Bitcoin so risks of manipulations and frauds are many.

Conclusion

For the governments, sustainable public service is not possible without using emerging technologies like Blockchain subject to the condition that appropriate actions are taken to subjugate risks and vulnerabilities. The audit profession in this regard could play a vital role in the face of challenges if new capacities and technological learnings are promoted. By doing so, public auditors could contribute to assuring the businesses and governments on the widely adopted technologies and also could establish new avenues of trust to be further rested on the Supreme Audit Institutions.