Blockchain and the transformative impact on business, society and the economy[i]

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Abstract

Blockchain may be viewed as a technology as well a phenomenon with a disruptive impact on the economy and society. Because it leads to the decentralisation of power, blockchain is viewed as a threat to the powers that be – central banks, and state authorities. This article also discusses blockchain and the outcome economy, and examines the challenges and issues pertaining to its adoption.

Keywords: *Blockchain, decentralisation of power, outcome economy, data validation, consensus mechanism, data ownership, jobs*

Introduction

Trying to describe blockchain reminds me of the parable of the blind men and an elephant. Depending on where we're coming from, blockchain is seen in a different light in terms of emphasis and importance as well as prior experience including our biases and preferences. We learn and conceptualize what the thing is based on our earliest encounters with it. So, for the uninitiated when it comes to blockchain, the first thing that comes to mind is probably Bitcoin, not even the generic cryptocurrency. But as we deep dive into this, we find that those engaged in the world of Fintech will attach a specialised meaning to the term as

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they rely on blockchain technology, including Ethereum, as the 21st century distributed ledger technology (DLT). Suffice it to say that Ethereum is a technology for the conduit of cryptocurrency building on Bitcoin's innovation, empowering the use of digital money by bypassing intermediaries like payment providers or banks.

Developers treat blockchain as a framework of protocols and encryption technology for secure data storage on such a network. Incidentally, according to a recent study, developers with blockchain skills are now the hottest ticket in town especially in the freelance marketplace. The report says that blockchain technologists are second only to those with skills in robotics. That's the kind of job disruption it is causing. Well, that's not surprising if we consider that for technologists, blockchain is hailed as the next force to drive the next internet revolution and on that score, the question is raised whether blockchain is a mere technological revolution or in fact an institutional revolution – a paradigm change.

Fundamental question

We may view blockchain not as technology but as a phenomenon that could unleash disruptive change to the economy. But an immediate caveat is in order – disruptive does not necessarily mean negative or destructive though these terms are sometimes wrongly collated. Again, the idea of disruption is no longer earth-shattering. We are now familiar with the mother of disruption and that is the Fourth Industrial Revolution. Since entering the new decade of 2021, increasing presence of disruption has been coming from advanced robotics and autonomous transport with artificial intelligence and machine learning, advanced materials, biotechnology and genomics, triggering consequences of

no small magnitude. We therefore need to contextualise blockchain in terms of its effect on the economy and society. When we say that blockchain is revolutionary, we are saying it as being subsumed under an even bigger wave in paradigm change under the Fourth Industrial Revolution. It was not a coincidence that the first or immediate utilisation of blockchain technology was in a central human activity i.e. money or to be more accurate, the exchange of monetary value to facilitate transactions. Now, this is not a biological activity necessitated by man's primal urges and needs. If we had not progressed more, we would have continued to be hunters and gatherers with no need for sophisticated commercial exchange whether through barter trade or otherwise. However, it did not take long for the human species to come around to the realisation that apart from amassing for your own needs, you could eye your neighbour's produce and if you could not forcibly grab them, you could make a deal through the medium of exchange of value.

The imperative for blockchain is said to be due to the fact that digital transactions don't have a minimum size the way transactions do in the analogue world, thus warranting not just a new but radical approach that circumvents the conventional role played by the intermediary. The keyword here is the decentralization of power. Blockchain enables data collection on every party in the transaction, taking a piece of the value along the trajectory and at the same time, "it can redirect *existing* value flows" by gradually chipping away the control of central market powers over business currencies, namely, data, access, technology, and contracts.[ii] Indeed, it is this power to create new value and unlock existing value flows that makes blockchain one of the most revolutionary technologies available today. Nevertheless, blockchain has had its winter of discontent – the "trough of disillusionment" – before finally stamping its mark

of authority in the alternative digital world. While each technology has its own maturity path, collateral issues of scalability, reliability, and security continue to await final resolution. From the socio-economic perspective, the overarching concern remains that of capability and capacity "to participate in a fair and accessible digitally-enabled world economy and society."[iii] This immediately raises the question of what is fair and what is equitable which ultimately hinges on the basic problem of the criterion for value and exchange.

Decentralisation of power and its discontents

From time immemorial, the control of how value is set, quantified, and exchanged, has defined mankind's civilizational trajectory because with value comes control and with control comes power. As canvassed earlier on the alleviation of control, the issue is one of fundamental concern and that is the role of centralisation or command and control from the pivot or the so-called axis that sees everything. This reminds us of George Orwell's *Nineteen Eighty-Four* "Big Brother", the omnipresent, all powerful authority that never sleeps in order to keep that watchful eye over society. In this regard, blockchain technology marks a shift from the pivot of state or centralised authority to the periphery of individual human actors. In the value equation, this will automatically shift the locus of value creation and determination as well. As blockchain technology challenges in a fundamental way and expands the spectrum of value, an entirely new ecosystem will evolve. It is in this context that I see the repercussions of blockchain technology – not just the technological leap but a paradigm leap with multi-dimensional impact on society.

The centralisation of power was philosophically justified on the economies of scale and the technologies coming from the first and second industrial

revolutions were fashioned and skewed towards the exercise of power and control from the centre. So, the question is how does blockchain change the equation? Or to put the question more specifically – what is the difference between centralized organisation and blockchain network distribution? "What centralized organisation enabled was trust, coordination and cooperation within organisations, but what the blockchain enables is trust, coordination and cooperation between organisation and between individuals peer-to-peer."[iv]

The outcome economy

To bring it down to a more practical level, the transformative effect of blockchain could therefore be seen by how society views the factors of production and economic output. Where once the language was one of products and services, the Fourth Industrial Revolution heralds the age of solutions and outcomes. Hence, the concept of the outcome economy. The customer is not looking at your product or your service. She wants the outcome.

And this is possible because with the digital age comes the proliferation of connected sensors. With the meshing of domains of the physical world with the virtual, the biological with the digital, IoT with Big Data and advanced analytics, the desired outcomes are delivered. There must be a Spatial Web or Web 3.0 for the distributed cloud, a decentralised web with the Fourth Industrial Revolution and the meshing of domains. In this emerging world of the Spatial Web, we bear witness to the fusion of the physical world and virtual realities in an atmosphere in a 3D space, with key elements such as AI, Virtual and Augmented Reality (VR/AR), IoT, advanced networking (e.g., 5G), geolocation, IoT devices and artificial intelligence/machine learning (AI/ML), and of course, the distributed ledger technology of blockchain. It is no longer a question of

whether but when we will finally attain the growth and full convergence of these enabling technologies as many beta models are already yielding significant outcomes to drive competitive advantage.[v]

Thus, in the discourse on the impact of blockchain technology on industry and the economy, it behoves us to consider what targeted outcomes do we expect of this new phenomenon. The outcome economy therefore warrants that companies will need more and better data to calculate costs, manage risks and track all the factors required to deliver the promised value. The conventional wisdom suggests that provider risk will increase with markets moving to value based on outcomes with multiplier effects on the generation of new financial tools geared towards better risk management. The saying is you can't make an omelette without breaking eggs. That is to say, you cannot guarantee outcomes without incurring risks associated with guaranteeing outcomes. But that's exactly the point – you can make your omelette without breaking those eggs as far as blockchain technology and risk management is concerned.

First, the consensus is that blockchain technology promises to mitigate *settlement risk*. In other words, your trade will not bounce back because there will be no glitch in the settlement process. Second, blockchain technology will rid the financial world of *counterparty risk*. So, your counterparty will not default before settling a trade. Third, and this is the *pièce de résistance*, which is the mitigation against systemic risk or what is known in Fintech as the *Herstatt risk*. Or the sum total of outstanding counterparty risk. As blockchain enables instant settlement, it also eliminates systemic risk in its entirety.[vi] Add to this is the fact that new accounting methods using blockchain's distributed ledger will make audit and financial reporting transparent and occur in real time. It will also

dramatically improve the capacity for regulators and other stakeholders to scrutinize financial actions within a corporation.[vii]

It is said that in the developing world, the path to successful entrepreneurship remains laden with bureaucracy and corruption in spite of the digital revolution supposedly bringing limitless possibilities for innovation and economic progress. The inequality gap has not narrowed as the rich get richer and the poor become poorer even in the developed world. Youth unemployment globally has plateaued at 20 percent. Today, the global one percent owns half the world's wealth while 3.5 billion people earn fewer than two dollars a day.[viii] Would blockchain be able to provide the solution to this global problem of growing inequality? That is the question.

Blockchain technology is already engendering a new form of financial identity enabling individuals to create a persistent digital ID and verifiable reputation and deploy it in different relationships and transactions. The blockchain endows this digital ID with trust and access to financial services.[ix] As the cost of transactions is slashed, the economy will be boosted, even reshaped. It therefore makes sense to invest in developing technology that can enable transformative applications. These should be synergised with a new business model with new approaches in the logic of value creation.

Data validation and Blockchain's consensus mechanism

Another transformative scenario can be expected in large-scale public identity systems for such functions as passport control, and algorithm-driven decision making in the prevention of money laundering and in complex financial transactions that involve many parties.[x] Reliability and fidelity stems from

advancements in data accuracy attained through the utilisation of FIR tools and applications to secure and process data from multiple sources, validated and audited with blockchain's consensus mechanism. Data that is inconsistent with normal patterns and system rules will be automatically rejected triggering early warning of data breaches or tampering or other defects in machine systems.[xi]

Yet another example of the digital synergies derived from the combination of blockchain with FIR tools such Al and loT is *digital twins*, which, as the term suggests, are exact digital/cyber/virtual replicas of any tangible physical system. Running on a competent IT infrastructure, the digital twin is typically a software program that takes real-world data about a physical system as prospective inputs and produces outputs in the form of insights, and in the process, adding value and decision-enabling predictions. The outcome: production of highly optimized and organized products with less cost and risk. [xii] Digital twin technology per se is not entirely new as evidenced in the manufacturing industry having utilised it for some time now in their operations but thanks to synchronization with FIR pioneering technologies, its contributions have been given an exponential boost. Now, with the advent of blockchain technology, the scope for digital twins has gone up remarkably, producing additional competencies and fresh use cases for enterprises.[xiii] For instance, the Airport Authority of Hong Kong has adopted the digital twin paradigm to enhance its facility planning and management to support the airport's expansion. Now, while it is true that the airport authority is a centralized organization, and its twin does not reside on a blockchain, consider the limitless possibilities of the paradigm utilised in sync with blockchain in an environment involving multiple facility owners and stakeholders. The participants would be able to enjoy the benefits of data validation and protection as well as distribution of access to

diverse locations for interaction and optimal decision-making including alternative financing options. There is indeed a multiplicity of other uses when these synergies are extended to the idea of the blockchain society in the health-care, pharmaceutical, and medical research industries sectors but further discussion on this will occupy too much space for this present undertaking.[xiv]

Challenges and issues

Among the challenges is unsustainable energy consumption. The mining required to support the bitcoin network currently consumes so much energy that it is simply unsustainable, leaving what has been described as "a Godzilla-sized carbon footprint". As early as 2015 it was reported that the combined processing power was hundreds of times greater that the aggregate output of the world's top five hundred supercomputers.[xv] To put it another way it can actually support energy consumption of a few nations and by recent counts, at least USD1.5 billion a year.

Now, the question remains whether blockchain network can hold its own against central authority, the Orwellian Big Brother. And the challenge is one for the central authority as well. It is said that the challenge for regulators or governments is formidable for they have to "oversee the unforeseeable". They need a balancing act. They should not overreact to worst cases in order to avoid stifling innovation. They must also not twist unproven applications to restrict civil liberties or encroach on fundamental freedoms enshrined in the constitution.[xvi]

It is said that the blockchain is a job killer. For example, as an extraordinary platform for radical automation say in financial services, blockchain can well

eliminate tens of thousands of jobs in accounting and IT systems management. And we cannot imagine the disruption in employment in the unskilled market for relatively routine tasks.[xvii]

While it has been firmly advocated that validation and protection of data in blockchain consensus protocol is a major plus feature, it should not be forgotten that as security becomes more advanced and significantly more complex, there is no such thing as an "unhackable" system. In this vein, notwithstanding the fact that blockchain complete solutions are touted for their reliability, vulnerabilities remain in the peripheral technologies used with the distributed ledger technology. For instance, cryptocurrency wallets in their current form are susceptible to attacks and token holdings have been compromised at crypto exchanges while the security of smart contract code IoT systems remains largely illusory.[xviii] Furthermore, even with marked improvements in hack-proofing protocols under the existing paradigm, quantum-proofing would pose the greatest challenge. Thus, it is said that within a decade, regardless of the security measures against unauthorised access, quantum computing is expected to be able to hack into cell phones, bank accounts, email addresses and bitcoin wallets.[xix]

Above all, another major issue in the blockchain in society discourse, is one that transcends the mechanics and logistics surrounding its usability and material benefits, touching instead on the fundamental question of decentralization of control, which we alluded to earlier. With blockchain, the question is who ultimately controls and hence has the final say on data ownership. What happens when a single entity or member of society gains access to all the data collated in the course of blockchain utilisation? Indeed, the answer may well lie

in the very raison d'être of blockchain technology itself, which is the rejection of centralized control, which in many ways, is already happening. The Orwellian Big Brother has been around for some time – central banks and internal revenue departments, not to mention social media conglomerates. The answer lies in "building decentralized systems and rejecting the centralized models pushed by powerful corporations" and this would entail weaning society of the dependence on centralized platforms. While this would not be feasible in democratic societies without strong commercial alternatives, it would pose an even greater obstacle in less democratic societies, let alone totalitarian states.[xx]

Conclusion

The interesting fact about the elephant parable is that it cuts across the board in its variegated versions traversing the great religions, East and West. To my mind, it serves an important purpose which is to separate truth from fallacy, fact from fantasy and reality from appearance. What is even more important is that it gives us a profound lesson into our humanity and that is, that we tend to see or perceive things according to our own subset of biases or preferences and in doing so, become captive to our own wall of absolutism. So, we should step back and start viewing things in greater perspective, allow for the various shades of grey, rather than become concretized in only hues of black and white. While we may sometimes need to hold on fast to what we perceive as absolute truths, we should not deny ourselves some space for a broader view, greater balance and admit that there are times when we cannot be too sure of anything.

End notes

[i] Adapted and expanded from the Keynote Address by Prof Dr Mohd Faiz Abdullah, Dean of Selangor Business School at the forum on "Adoption of Blockchain Technology in Industry and Higher Learning" held on 27 June 2018 at the Selangor Business School, Petaling Jaya.

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[iii] Ibid, 6.

[iv] Coding Tech. "Blockchain technology explained". *YouTube* video, 1:54:53. February 28, 2018. https://www.youtube.com/watch?v=qOVAbKKSH10

[v]Allan V. Cook, Mike Bechtel, Siri Anderson, David R. Novak, Nicole Nodi and Jay Parekh, "The Spatial Web and Web 3.0", *Deloitte Insights*, July 21, 2020. https://www2.deloitte.com/us/en/insights/topics/digital-transformation/web-3-0-technologies-in-business.html/#endnote-5

[vi] Don Tapscott and Alex Tapscott, *Blockchain Revolution – How the technology behind bitcoin is changing money, business, and the world* (Penguin, 2016), 59-60.

[vii] Ibid, 63-64.

[viii] Ibid, 172-73.

[ix] Ibid, 177.

[x] Marco Iansiti & Karim R. Lakhani, "The Truth About Blockchain Marco" January-February 2017 issue

[xi] Furlonger, David, and Uzureau. *The Real Business of Blockchain*, 156.

[xii] Pethuru Raj, "Empowering digital twins with blockchain," *Advances in Computers*, (2021; 121): 267–283. doi: 10.1016/bs.adcom.2020.08.013; accessed 29 August, 2021

[xiii] Ibid.

[xiv] Furlonger, David, and Uzureau. *The Real Business of Blockchain*, 202 – 203.

[xv] Ibid, 259.

[xvi] Ibid, 263-64.

[xvii] Ibid, 270.

[xviii] Ibid, 210.

[xix] MacKenzie Sigalo, "Hacking bitcoin wallets with quantum computers could happen – but cryptographers are racing to build a workaround," Published June 10 2021, https://www.cnbc.com/2021/06/10/long-term-crypto-threat-quantum-computers-hacking-bitcoin-wallets.html

[xx] Furlonger, David, and Uzureau. *The Real Business of Blockchain*, 156 – 157.