



Blockchain

Exuding Hope or Hype?

Case Study

This case was written by **Dr. Garima Ratna** and reviewed by **Dr. A. Saravanan Naidu**, Amity Research Centers Headquarter, Bangalore. It is intended to be used as the basis for class discussion rather than to illustrate either effective or ineffective handling of a management situation. The case was compiled from published sources.

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Blockchain: Exuding Hope or Hype?

Abstract: Founded in 2008, Blockchain technology was believed to possess enormous disruptive potential across industries and sectors. Its characteristics and advantages were lauded as some kind of magic wand which would impact the industries in a profoundly positive way. But then, as the years progressed the hype generated around the technology seemed to replace scepticism. The scepticism was regarding the actual strategic value that the technology could deliver. Many questions were raised by analysts. Whether Blockchain's advantages served a good ROI? Did Blockchain add value which could eventually be transferred to customers? Was the technology offering a definitive competitive advantage to businesses? Were the huge investments in adopting the technology worth it?

Case Study

"Whether to adopt Blockchain is not merely a technological decision; it is also a business decision. Good use cases must solve real problems for organizations. Great use cases solve real problems at a cost that is significantly lower than the benefits the adoption brings. As the decision-makers within an organization, it is important not to be tempted by the hype but instead to think honestly about whether using Blockchain is a sound business decision – even in those cases where a well-defined problem exists."¹

– Excerpts from the WEF White Paper² *Blockchain*

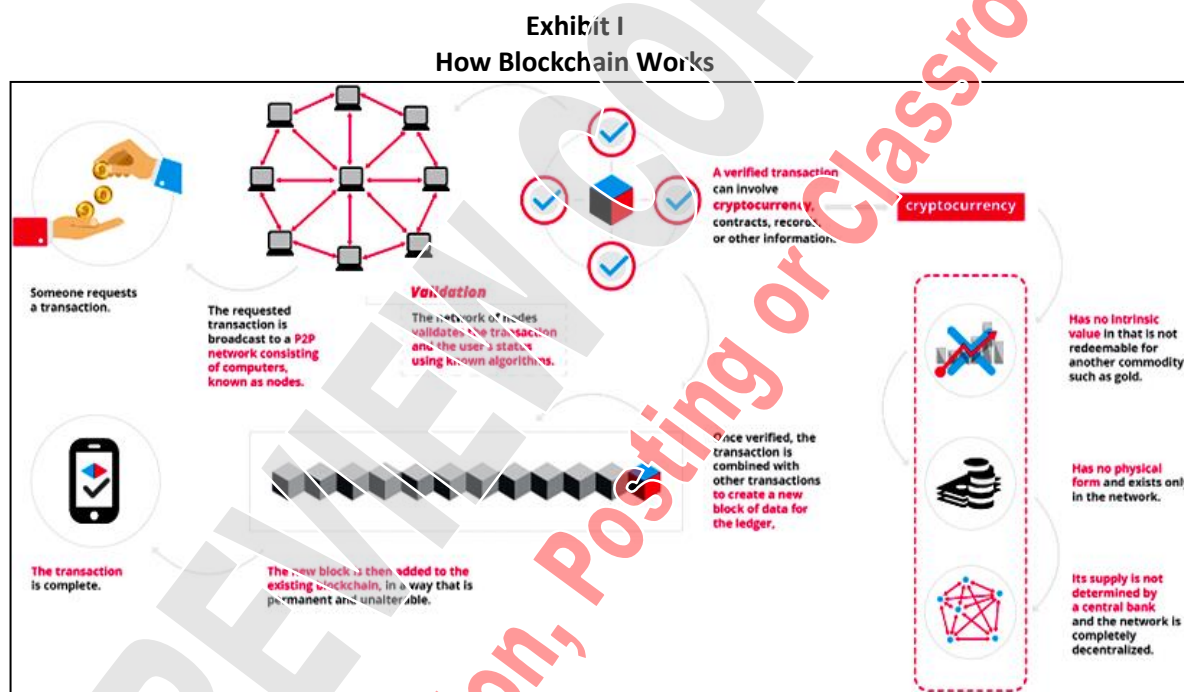
Since 2008, when Satoshi Nakamoto founded Blockchain, the buzz around the technology had refused to fizzle out. What had probably fizzled out was the hype around it. Post the initial euphoria wherein everyone was fascinated by the immense disruptive potential, analysts were debating the exact business value of the technology. Following the 'herd mentality', companies were either in the process of investing or had already invested billions without making a realistic assessment of the ROI. In many cases it was revealed that the cost or operational efficiency achieved after implementing Blockchain could be achieved by other less costly techniques or processes. This led tech experts to believe that a categorical approach was the need of the hour wherein the impact of the Blockchain technology was assessed and evaluated on the basis of type of industry, operating model, business function, kind of business problem, ROI, and several such parameters. Blockchain was not the case of 'one technology fits all'. A proper strategic value assessment was required before rushing to incorporate Blockchain into businesses. In the wake of this thought process, the million dollar question troubling analysts was: Was the hype around Blockchain justified?

¹ Mulligan Catherine, et al., "Blockchain Beyond the Hype A Practical Framework for Business Leaders", http://www3.weforum.org/docs/48423_Whether_Blockchain_WP.pdf, April 2018

² World Economic Forum White Paper titled – 'Blockchain Beyond the Hype A Practical Framework for Business Leaders'.

Blockchain: Transforming the Business World

According to Don and Alex Tapscott, Authors of the book '*Blockchain Revolution*' published in 2016, "The Blockchain is an incorruptible digital ledger of economic transactions that can be programmed to record not just financial transactions but virtually everything of value." **(Exhibit I)**. Founded by Satoshi Nakamoto in 2008, the technology was transparent, incorruptible, self-auditing, having innumerable computing 'nodes', decentralised with each group of transaction referred to as a 'block'.³ **(Annexure I)**. The technology did not require any third party authentication.⁴ Also known as Distributed Ledger Technology (DLT), Blockchain was of three types: permissionless public systems, private permissioned systems and hybrid systems; each having its own objectives, advantages and disadvantages.⁵



Source: "Is Blockchain technology the new internet?",
<https://blockgeeks.com/guides/what-is-Blockchain-technology/>

As of February 2018, almost 15% of financial institutions used Blockchain technology in their daily business.⁶ As reported by World Economic Forum (WEF), by the year 2027 assets equivalent to as much as 10% of the global GDP would be locked in Blockchain. In addition, the technology was projected to ease global transactions and transfers and chop off operational costs by a substantial \$22 billion each year.⁷ The technology had many advantages too.⁸ **(Exhibit II)**. Technology experts explained that the "Blockchains use cryptography to process

³ "Is blockchain technology the new internet?", <https://blockgeeks.com/guides/what-is-blockchain-technology/>

⁴ Marr Bernard, "A Very Brief History Of Blockchain Technology Everyone Should Read", <https://www.forbes.com/sites/bernardmarr/2018/02/16/a-very-brief-history-of-blockchain-technology-everyone-should-read/#49e8abc07bc4>, February 16th 2018

⁵ "Blockchain Beyond the Hype A Practical Framework for Business Leaders", *op.cit.*

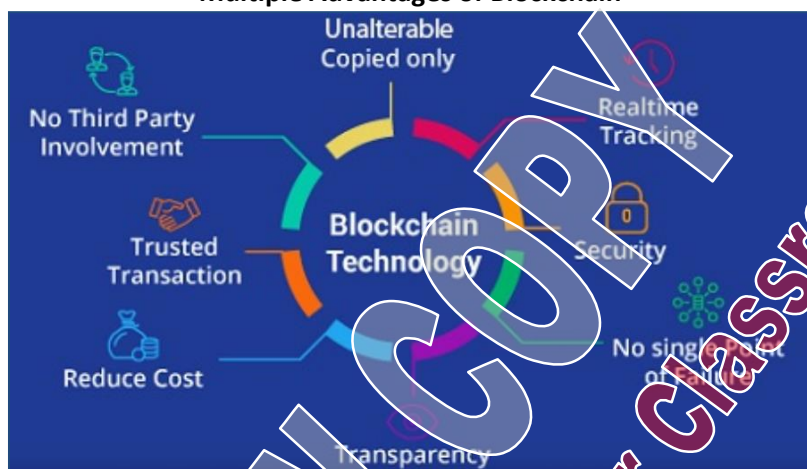
⁶ "A Very Brief History Of Blockchain Technology Everyone Should Read", *op.cit.*

⁷ Shaik G B, "Adopt Blockchain Technology for Competitive Advantage", <https://blockchain-technology.cioreviewindia.com/cxinsight/adopt-blockchain-technology-for-competitive-advantage-nid-3835-cid-135.html>

⁸ "Is Blockchain Technology The New Internet?", <http://www.wakiawa-crypto.com/is-blockchain-technology-the-new-internet/>, August 23rd 2018

and verify transactions on the ledger. Encryption and coding improve transparency, efficiency and trust in information-sharing.” A clear competitive edge lay hidden in Blockchain technology⁹ which experts explained went through three distinct developmental stages.¹⁰ (Annexure II).

Exhibit II
Multiple Advantages of Blockchain



Source: “Is Blockchain Technology The New Internet?”, <http://www.wakiawa-crypto.com/is-blockchain-technology-the-new-internet/>, August 23rd 2018

The inherent advantages of the Blockchain technology were pitched to benefit the business world too. According to technology experts, businesses which were transaction-based, or which benefited from public scrutiny or the ones which benefited from history that could not be rewritten or where decentralisation benefitted the end user or customer were potential users of Blockchain.¹¹ There were only a handful of industries/sectors left untouched by the impact of Blockchain technology. In education sector, for instance, the technology could help with keeping, validating and verifying the records of the students as well as of staff. A secure database of test scores, transcripts and personal profile information could be saved and maintained much more efficiently.¹² Gaming industry could witness major disruption. Gaming enthusiasts could trade the ownership or buy or sell in-game products through smart contracts or through cryptocurrencies. Music industry could be similarly disrupted with ownership of music rights, in part or in whole, being disbursed through Blockchain.¹³ Finance and banking industry was already under disruption in big way with cryptocurrencies and Initial Coin Offering (ICO) making headlines everywhere. Complete security in storing and transmitting data, open and transparent network infrastructure, decentralised *modus operandi*, low cost of operations by getting rid of unnecessary intermediaries were some of the ways in which Blockchain was disrupting finance and banking world.¹⁴ In healthcare, too, ease, safety, security and

⁹ Misra Parth, “5 Ways Blockchain Technology Will Change the Way We Do Business”, <https://www.entrepreneur.com/article/309164>, March 20th 2018

¹⁰ Bjørnstad Vitsø Magnus, et al., “A study on blockchain technology as a resource for competitive advantage.”, https://brage.bibsys.no/xmlui/bitstream/handle/11250/2472245/17527_FULLTEXT.pdf?sequence=1, June 2017

¹¹ Linuma Arthur, “What Is Blockchain And What Can Businesses Benefit From It?”, <https://www.forbes.com/sites/forbesagencycouncil/2018/04/05/what-is-blockchain-and-what-can-businesses-benefit-from-it/#12703494675f>, April 5th 2018

¹² “Blockchain and Education – Industry Impacts”, <https://blockchain.wtf/2018/07/industry-impacts/academic/blockchain-and-education/>, July 17th 2018

¹³ Cole Nicolas, “5 Industries About To Be Disrupted By Blockchain Technology”, <https://hackernoon.com/5-industries-about-to-be-disrupted-by-blockchain-technology-d963c3988b91>, August 3rd 2018

¹⁴ “Blockchain is Reshaping the Banking Sector”, <https://medium.com/universablockchain/blockchain-is-reshaping-the-banking-sector-fd84f2f9c475>, June 6th 2018

authenticity of data storage were enhanced by Blockchains.¹⁵ Other sectors impacted were real estate, politics, legal industry, rentals and ride sharing, security, governments, waste management, video streaming, crowd funding, human resources, etc.^{16,17} **(Annexure III).**

Analyst showered praises on this disruptive technology. Joe Lubin, Co-founder of Ethereum¹⁸, stated, "There won't ever be a single powerful entity that controls the system or controls gatekeeping into the system the way Blockchain does." Similarly, Andrew Medal, Contributor to *Entrepreneur*¹⁹, remarked, "The immutable and transparent nature of the Blockchain is what has so many people racing to incorporate it into their IT strategies. As a decentralized platform for innovation, Blockchain technology, over time, will revolutionize virtually every industry. First movers will have the distinct advantage of figuring out how Blockchain can get their business to the next level. They'll also figure out earlier than their competition does the challenges that come with any new IT integration."²⁰ David Eyton, Head of Technology BP²¹, added, "There are uses for Blockchain that could give us a competitive advantage. Blockchain can be much more efficient in terms of speed and verification of transactions. In a big company, with lots of different corporate entities, you have to manage financial settlements and reconciliation between different parts of the business. A lot of that lends itself to Blockchain."²² Meanwhile, tech analysts believed that in order to get incorporated and integrated into the basic fabric of business, Blockchain businesses needed to focus on few crucial components **(Exhibit III).**

Meanwhile, the promise of the Blockchain technology was prompting businesses to invest heavily in it. As of July 2018, as many as 50 large public sector companies including Industrial and Commercial Bank of China, China Construction Bank Corporation, JPMorgan Chase & Co., Berkshire Hathaway Inc., Bank of America, Wells Fargo & Company, Apple Inc., etc. were in the process of investing billions of dollars in the technology.²³ The intention to gain competitive advantage was driving many industries to invest in the technology.²⁴ As reported by McKinsey analysts Brant Carson, et al., "Venture-capital funding for Blockchain start-ups consistently grew and were up to \$1 billion in 2017. The Blockchain-specific investment model of initial coin offerings (ICOs), the sale of cryptocurrency tokens in a new venture, has skyrocketed to \$5 billion. Leading technology players are also heavily investing in Blockchain: IBM has more than

¹⁵ Krishnan Abhimanyu, "24 Industries That Blockchain Will Radically Transform", <https://www.investinblockchain.com/blockchain-transform-industries/>, February 27th 2018

¹⁶ Marr Bernard, "Here Are 10 Industries Blockchain Is Likely To Disrupt", <https://www.forbes.com/sites/bernardmarr/2018/07/16/here-are-10-industries-blockchain-is-likely-to-disrupt/#3abc8034b5a2>, July 16th 2018

¹⁷ "Banking Is Only The Beginning: 50 Big Industries Blockchain Could Transform", <https://www.cbinsights.com/research/industries-disrupted-blockchain/>, December 19th 2018

¹⁸ Ethereum is an open source, public, blockchain-based distributed computing platform and operating system featuring smart contract functionality.

¹⁹ Entrepreneur is an American magazine and website that carries news stories about entrepreneurship, small business management, and business.

²⁰ Medal Andrew, "These 6 Industries Are Using Blockchain to Gain a Competitive Advantage", <https://www.entrepreneur.com/article/311164>, March 30th 2018

²¹ BP plc is a British multinational oil and gas company headquartered in London, England.

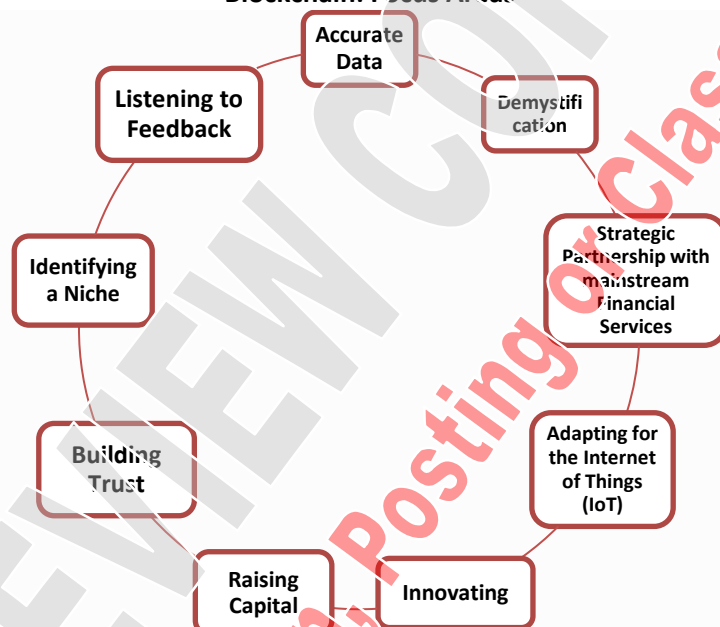
²² De Nikhilesh, "BP Tech Chief: Blockchain Could Give Company 'Competitive Advantage'", <https://www.coindesk.com/bp-tech-chief-blockchain-give-company-competitive-advantage>, October 3rd 2017

²³ Castillo del Michael, "Big Blockchain: The 50 Largest Public Companies Exploring Blockchain", <https://www.forbes.com/sites/michaeldelcastillo/2018/07/03/big-blockchain-the-50-largest-public-companies-exploring-blockchain/#2f657dad2b5b>, July 3rd 2018

²⁴ "Adopt Blockchain Technology for Competitive Advantage", op.cit.

1,000 staff and \$200 million invested in the Blockchain-powered Internet of Things (IoT).²⁵ However, there lacked an analytical dialogue as to whether these robust investments were worth it. As put by researchers Magnus Vitsø Bjørnstad, et al., "...the Blockchain literature, generally, being of a predictive nature, where the potential opportunities of the technology are widely covered, but the discussion on how Blockchain can contribute to create value within companies is still lacking. The focus is on what could happen if Blockchain is adopted by the masses, and underlying potential use cases, without going into value creating processes of Blockchain."²⁶ From 2016 to 2018, half a million new publications focusing on Blockchain technology and nearly 3.7 million Google search results pointed to the hype around it. But then, was this hype justified?²⁷

Exhibit III
Blockchain: Focus Areas



Source: Compiled by the Author from – Daniel, "How Can Blockchain Technology Companies Become More Competitive?", <https://www.chipin.com/Blockchain-technology-competitive-companies/>, October 23rd 2017

Will Blockchain Rise Above the Hope or Hype Paradox?

In June 2018, a team of McKinsey analysts published their work titled, '*Blockchain beyond the hype: What is the strategic business value?*' wherein they busted myths about the advantages and limitations of the Blockchain technology. In addition, the analysts came up with six distinct categories of Blockchain use cases based on the two primary needs: record keeping and transactions. Some key takeaways were also identified. Firstly, 'Blockchain does not need to be a disintermediator to generate value', secondly 'Feasibility at scale is likely to be three to five years away' and lastly 'In the short term, Blockchain's strategic value is mainly in cost reduction'. According to tech experts, Blockchain's ability to simplify transaction and curtail cost could be leveraged by businesses. Permissioned Blockchains were touted to deliver more

²⁵ Carson Brant, et al., "Blockchain beyond the hype: What is the strategic business value?", <https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/blockchain-beyond-the-hype-what-is-the-strategic-business-value>, June 2018

²⁶ "A study on blockchain technology as a resource for competitive advantage.", op.cit.

²⁷ "Blockchain beyond the hype: What is the strategic business value?", op.cit.

value than public Blockchains in the short term. According to McKinsey analysts, “Private, permissioned Blockchain allows businesses both large and small to start extracting commercial value from Blockchain implementations. For all companies, permissioned Blockchains enable distinctive value propositions to be developed in commercial confidence, with small-scale experimentation before being scaled up.” Again, according to tech analysts, Blockchain’s value lay in its potential to enhance operational efficiencies and reduce costs. As stated by them, “Cost can be taken out of existing processes by removing intermediaries or the administrative effort of record keeping and transaction reconciliation. This can shift the flow of value by capturing lost revenues and creating new revenues for Blockchain-service providers.” In healthcare, similarly, Blockchain technology could drive administrative efficiencies, easy access to historical, non-patient-identifiable data, to be utilised in advance medical research. As put by analysts, “Over time, the value of Blockchain will shift from driving cost reduction to enabling entirely new business models and revenue streams.” A research of roughly 90 use cases revealed that in the short term, nearly 70% of the value at stake was in cost reduction, then in revenue generation followed by capital relief depending on the nature of the industry (Annexure IV).

Blockchain technology’s feasibility, analysts pointed out, depended upon the type of asset, standards and regulations, technology maturity, and ecosystem. A critical mass was necessary for the technology to be feasible. The technology’s advantages increased manifold as the size of the Blockchain network increased, but then, the coordination complexity increased proportionally. For many industries this critical mass was not optimum while in others a network across industries was required to derive strategic benefits. Analysts advised that a ‘structured approach through a lens of pragmatic skepticism’ could be taken to understand the strategic value of Blockchain. As reported by McKinsey analysts, “The first step involves determining whether there is sufficient accessible value at stake for a given use case. Companies can only avoid the trap of developing a solution without a problem by rigorously investigating true pain points—the frictions for customers that Blockchain could eliminate. Identification of specific pain points enables granular analysis of the potential commercial value within the constraints of the overall feasibility of the Blockchain solution. If a use case does not meet a minimum level of feasibility and potential return, then companies do not even have to consider the second step of which Blockchain strategy to adopt.”²⁸ A White paper titled, *Blockchain Beyond the Hype A Practical Framework for Business Leader* published by WEF in April 2018, had similar perspective to share. This White Paper published the experiences and interactions of Blockchain experts with a group of C-suite executives from big companies wherein it stated, “Despite the strong interest in adopting the technology, the group had significant questions and confusion about whether Blockchain would actually address their business needs and had serious concerns about security, immutability and when to use a private or public Blockchain. This confusion is indicative of conversations with hundreds of private-sector leaders over the past year who expressed a need for objective and practical guidance in cutting through the hype and identifying where Blockchain could add true value to their companies.”²⁹

While advising to adopt a pragmatic approach, there were analysts who doubted the strategic business value of the Blockchain technology. Paul Stanley, CEO of 360Globalnet³⁰, stated his reservations thus, “There is nothing that Blockchain does in a practical sense that can’t already be done and indeed is being done by some carriers today. Customer can report claims digitally using video/imagery, the insurers ecosystem works on the one single digital record created (a

²⁸ “Blockchain beyond the hype: What is the strategic business value?”, op.cit.

²⁹ “Blockchain Beyond the Hype A Practical Framework for Business Leaders”, op.cit.

³⁰ 360Globalnet, founded in 2010, is an independent digital technology and services business focused on the worldwide insurance industry with offices in Europe, North America, Asia and Australia.

Blockchain by other means in effect). The whole process can be automated/ orchestrated at the desktop. Humans just needed for decision-taking and don't think Blockchain is any magic bullet for anti-fraud either. You don't need Blockchain technology to improve results - that can be done today ...available technologies do that now. Blockchain has a long long way to go to establish any meaningful application or value to Insurers."³¹ Similarly, Irving Wladawsky-Berger, Chairman Emeritus of the IBM Academy of Technology, and a Visiting Professor of Engineering Systems at MIT, compared Blockchain technology to that of Internet and stated, "Blockchain has the potential to transform our economic and social systems, but such a transformation is still many years away. Like the Internet, Blockchain is a foundational technology, whose adoption process is gradual, incremental and steady, unlike the hockey stick adoption we typically associate with disruptive technologies as defined by Clayton Christensen 20 years ago. Foundational transformations must overcome many barriers – technological, organizational, governance, political – which is why they take a long time to play out."³²

Analysts admitted that there was a lot of confusion regarding the business value of Blockchain. Businesses were falling prey to the 'herd mentality' wherein they were investing in the technology just because everyone said 'it's the next big thing!'. Gartner, a US based global research and advisory firm, foretold that 90% of the Blockchain projects initiated by the companies in 2016 and the first half of 2017 would be terminated in the subsequent 24 months. Ray Valdes, Vice President and Gartner Fellow, explained, "There are multiple causes for disappointing project outcomes, including rapid rate of technology evolution. However, a primary cause of failure is a fundamental lack of understanding around the basic concept of Blockchain technology, which results in a misalignment of its capabilities with the business problem that the enterprise is seeking to solve. Often this means that enterprise projects using – or claiming to use -- Blockchain technology don't actually need it to achieve their goal." Christy Pettey, a Contributor to Gartner, enumerated seven strategies to orchestrate successful Blockchain projects. These were: 'Narrow the scope to a concrete, achievable business goal', 'Expand the non-Blockchain parts of the project', 'Prepare to migrate', 'Expand the community', 'Declare an early victory and cut your losses', 'Capture integration points' and 'Cultivate and preserve new skills'.³³ The White Paper by WEF suggested a 'decision tree' approach to assess the business value of the Blockchain. The 'decision tree' was entailed with several questions that were useful to analyse whether a Blockchain was the best strategic fit for a particular business problem.³⁴ (Annexure V).

Despite understanding the disruptive potential of Blockchain technology, many analysts felt that the absence of any common standard and discrete rules and regulations served as major deterrent in Blockchain's ability to scale up. The mere fact that it was a relatively nascent or immature technology only added to scepticism around it.³⁵ According to Jimmy Song (Song), a Bitcoin developer, "We've been holding up Blockchain as this beacon of hope. And wrongly so." As it emerged that many of the business problems which were pitched to be solved by

³¹ "Blockchain beyond the hype: What is the strategic business value?", <https://www.360globalnet.com/english/blog/blockchain-beyond-the-hype-what-is-the-strategic-business-value>, July 5th 2018

³² Wladawsky-Berger Irving, "What's the Value of Blockchain?", <https://medium.com/mit-initiative-on-the-digital-economy/whats-the-value-of-blockchain-f818e3558dc3>, April 17th 2017

³³ Pettey Christy, "7 Strategies to Gain Value From a Doomed Blockchain Project", <https://www.gartner.com/smarterwithgartner/7-strategies-to-gain-value-from-a-doomed-blockchain-project/>, April 5th 2017

³⁴ "Blockchain Beyond the Hype A Practical Framework for Business Leaders", op.cit.

³⁵ "Blockchain beyond the hype: What is the strategic business value?", op.cit.

Blockchain could be settled by simply adopting a different approach.³⁶ Even the absence of intermediaries, the most propounded selling point of Blockchain was diluted by Grace Sweeney³⁷, who questioned, “But when the record-keeper of highly sensitive data and large sums of digital cash is no one, there leaves the question of — should there be a caretaker? While adding a caretaker kind of defeats the purpose, existing Blockchain users sometimes have trouble accessing permissions.”³⁸ As stated by Diego Mazo, a Strategic Design Assistant Professor, “Even though we all agree upon Blockchain has a huge potential to disrupt several industries, are we aware that we cannot apply Blockchain for every problem? It is necessary to reflect on the influence of trending topics and buzzwords that lead us to work on a technology that might not be the most appropriate for the project we are trying to develop.”³⁹ Worst criticism was showered on Blockchain by Kai Stinchcombe⁴⁰ who remarked, “Blockchain is not only crappy technology but a bad vision for the future. Its failure to achieve adoption to date is because systems built on trust, norms, and institutions inherently function better than the type of no-need-for-trusted-parties systems Blockchain envisions. That’s permanent: no matter how much Blockchain improves it is still headed in the wrong direction.”⁴¹ Was that really so?

Annexure I Characteristics of Blockchain

Characteristics	Explanation
Distributed ledger and transparency	A shared public list of transactions (the exchange of data) allows every peer in the network to have access to every transaction made, making the system transparent.
Decentralized data management	Every peer in the system has the authority to add data to the ledger, in other words make transactions. Meaning no one user owns the system more than any other.
Data security, tamper-proof, anti-forgery and data integrity	Blockchain is architected to store data such that it is immutable and tamper-proof. The decentralized nature of Blockchain makes it overly challenging to take advantage of the system by ill-intentioned users.
High efficiency	Checking balances and completing transactions in a Blockchain system can, in theory, be instantaneous.
No risk of centralized failure	The lack of a centralized storage system removes the risk of losing data and downtime due to problems with a centralized unit.
Flexible and reliable	Blockchains programmable features increase flexibility and reliability in different application scenarios.

Source: Bjørnstad Vitsø, Magnus, et al., “A study on Blockchain technology as a resource for competitive advantage.”,

https://brage.bibsys.no/xmlui/bitstream/handle/11250/2472245/17527_FULLTEXT.pdf?sequence=1,
June 2017

³⁶ Sweeney Grace, “Is the blockchain buzz dying down?”, <https://en.softonic.com/articles/future-of-blockchain>, January 25th 2019

³⁷ A freelance writer who specialises in blogging, content strategy, and sales copy and writes for SaaS, tech, and digital marketing companies.

³⁸ “Is the blockchain buzz dying down?”, op.cit.

³⁹ Mazo Diego, “The value of design in the blockchain space”, <https://medium.com/strategic-design-lab/the-value-of-design-in-the-blockchain-space-48d1a637e73e>, November 29th 2018

⁴⁰ He is the Founder and CEO of True Link Financial, Inc.

⁴¹ Stinchcombe Kai, “Blockchain is not only crappy technology but a bad vision for the future”, <https://medium.com/@kaistinchcombe/decentralized-and-trustless-crypto-paradise-is-actually-a-medieval-hellhole-c1ca122efdec>, April 5th 2018

Annexure II Developmental Stages of Blockchain

Type	Description	Examples
Blockchain 1.0	Currency	Cryptocurrencies like Bitcoin. Was first introduced in 2009.
Blockchain 2.0	Contracts	Financial services, crowdfunding, Bitcoin prediction markets, smart property, smart contracts. Was introduced through the release of NXT in 2013.
Blockchain 3.0	Justice, efficiency and coordination applications beyond currency, economics, and markets	Digital Identity, Intellectual Property Protection, Governance Services, Elections. Solutions within these areas of applications are starting to take form.

Source: Bjørnstad Vitsø Magnus, et al., "A study on Blockchain technology as a resource for competitive advantage.",

https://brage.bibsys.no/xmlui/bitstream/handle/11250/2472245/17527_FULLTEXT.pdf?sequence=1, June 2017

Annexure III Blockchain Disrupting Various Industries

 BANKING As a digitized, secure, and tamper-proof ledger, blockchain could serve the same function, injecting enhanced accuracy and information-sharing into the financial services ecosystem. CBINSIGHTS	 MESSAGING APPS Telegram is still developing its blockchain-based platform called the TON (Telegram Open Network) that extends Telegram's services into payments, file storage, and censorship-proof browsing for its 200M users. CBINSIGHTS
 HEDGE FUNDS Backed by names including First Round Capital and Union Square Ventures, Numerai is taking the hedge fund model — employing a bunch of traders and quants — and decentralizing it. CBINSIGHTS	 VOTING In the future, blockchain tools could serve as a foundational infrastructure for casting, tracking, and counting votes — potentially eliminating the need for recounts by taking voter fraud and foul play off the table. CBINSIGHTS
 INTERNET IDENTITY & DNS Platforms like Blockstack and uPort think there's a future where your identity can be easily carried with you around the internet. CBINSIGHTS	 CRITICAL INFRASTRUCTURE SECURITY If blockchain is more widely adopted, the probability of hacking could go down, as the cyberprotections of the technology are more robust than legacy systems. CBINSIGHTS
 RIDE SHARING With a distributed ledger, drivers and riders could create a more user-driven, value-oriented marketplace. CBINSIGHTS	 INTERNET ADVERTISING Users who opt in receive fewer, but better targeted ads without the malware. And advertisers get better data on their spending. CBINSIGHTS



3D PRINTING & MANUFACTURING

Using blockchain to support these evolving infrastructures can eliminate security vulnerabilities, protect intellectual property from theft, and streamline project management.

CBINSIGHTS



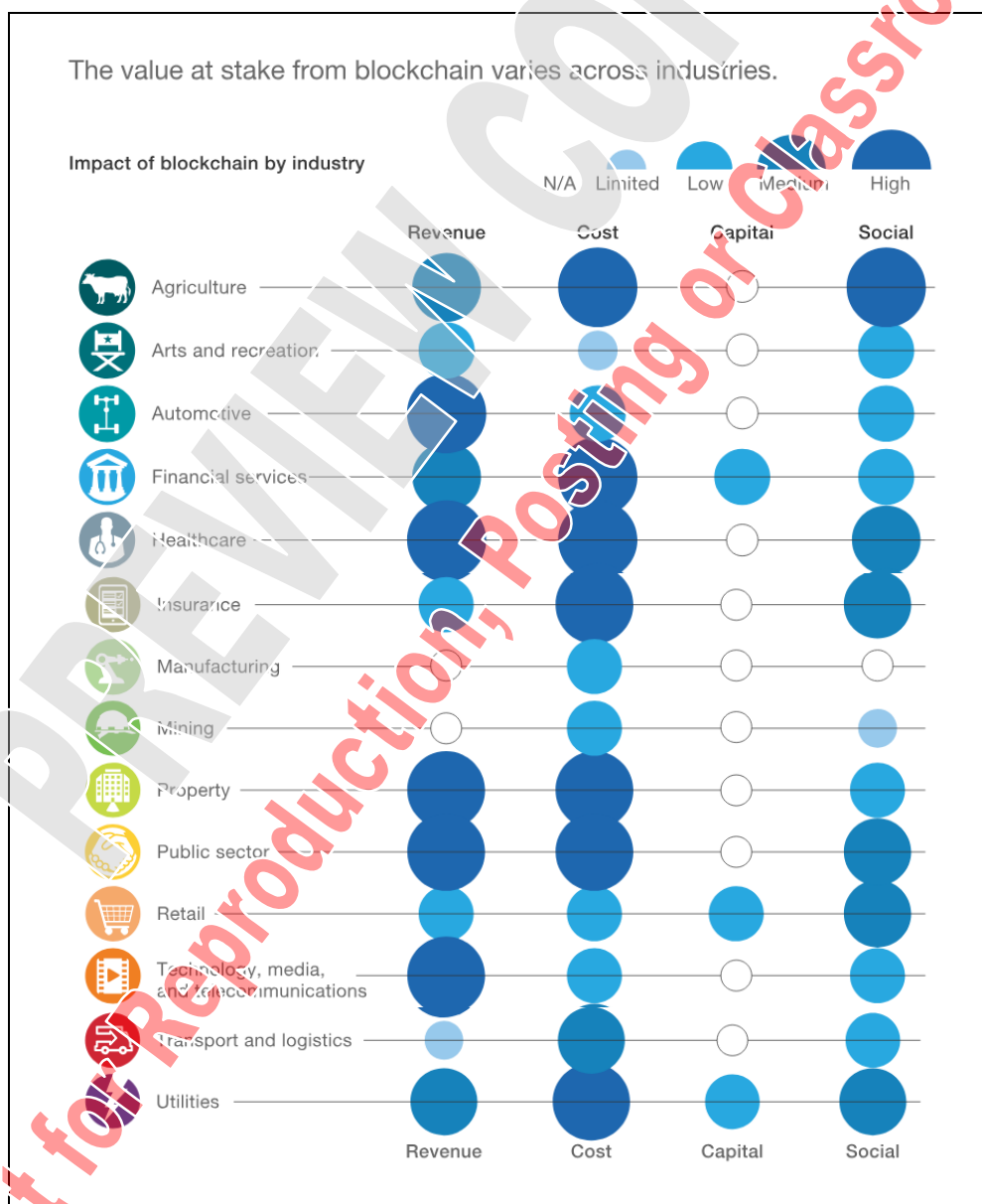
CROWDFUNDING

The crowdfunding industry emerged to "disintermediate" capital formation by giving backers or individual investors the ability to directly fund creators and entrepreneurs, providing a natural alignment with blockchain capabilities.

CBINSIGHTS

Source: "Banking Is Only The Beginning: 50 Big Industries Blockchain Could Transform",
<https://www.cbinsights.com/research/industries-disrupted-Blockchain/>, December 19th 2018

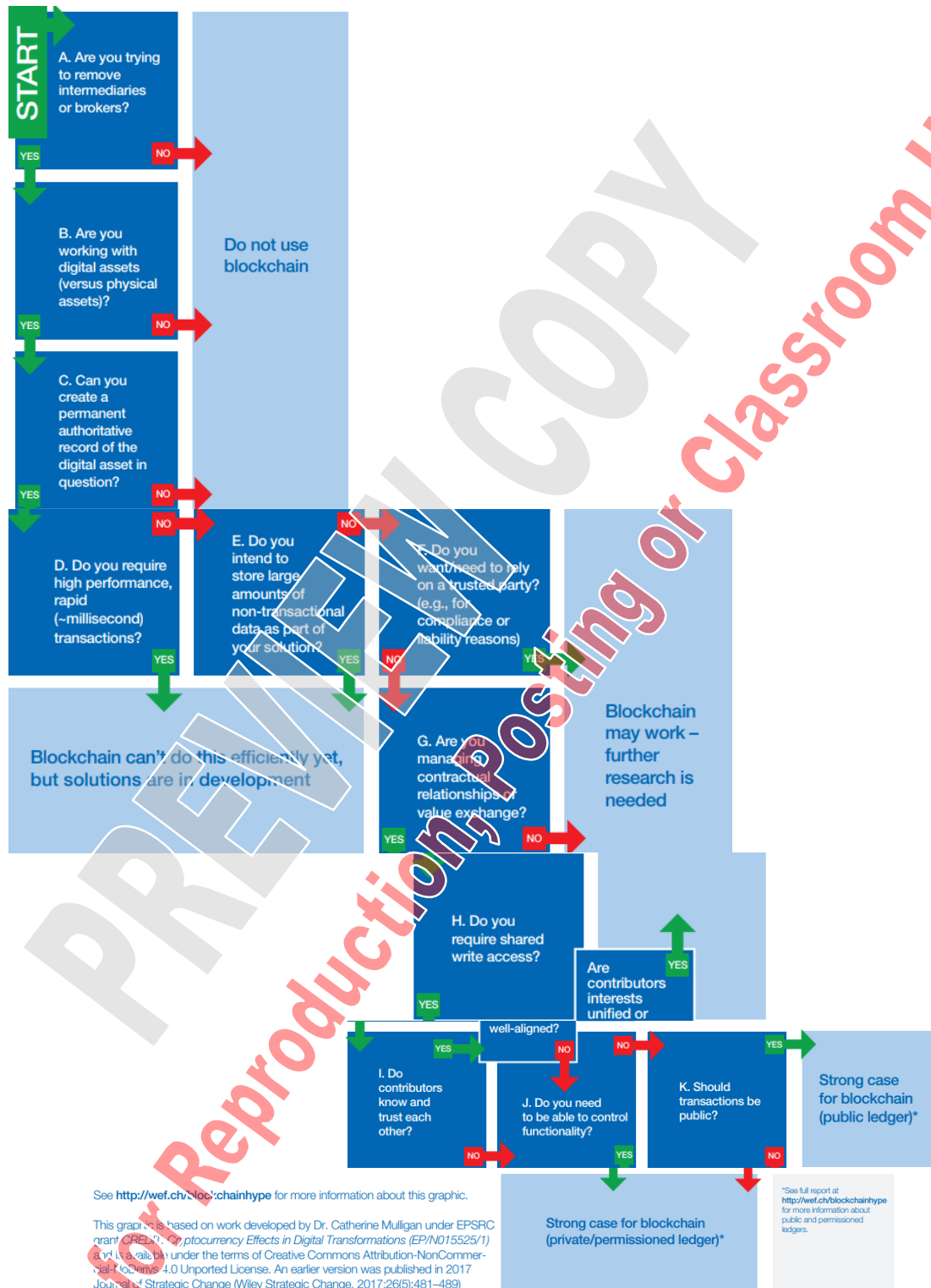
Annexure IV A Dissection of the Impact of Blockchain (Industry Wise)



Source: Carson Brant, et al., "Blockchain beyond the hype: What is the strategic business value?",
<https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/Blockchain-beyond-the-hype-what-is-the-strategic-business-value>, June 2018

Annexure V

Decision Tree to Assess the Business Value of Blockchain



Source: Mulligan Catherine, et al., "Blockchain Beyond the Hype A Practical Framework for Business Leaders", http://www3.weforum.org/docs/48423_Whether_Blockchain_WP.pdf, April 2018