Blockchain Technology: A Decentralized Future

Blockchain and Social Impact

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By
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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Introduction

Both my technical and STS research topics tackle blockchain technology. While my technical paper focuses on the advantages of decentralization, blockchain mechanics, and some applications, my STS paper takes a deep dive into social impact based on the idea that blockchain technology ensures *trust* between users, developers, and the platform itself through groundbreaking algorithmic and cryptographic mechanisms rather than based on the *trustworthiness* of participants within the network. This is an important topic to be familiar with as blockchain "technology is evolving as one of the promising technologies which acquire the attention of different industries and research backgrounds" (Thakur, 2022, p.1). From the healthcare industry to fintech applications, blockchain technology "promises benefits in trustability, collaboration, organization, identification, credibility, and transparency" (Leible et al, 2022, p.1). Blockchain is a shared distributed ledger technology (DLT) which minimizes the need for an intermediary to manage transactions and minimize the cost and chances of malpractice in the system. The features of this technology, delivered via composed and cautious blend of in-built enticements and effective cryptography, exclude the demand for a centrally ruling organization and instead circulate the power among all contributors in the blockchain ecosystem. The goal of my technical paper is to demonstrate the fundamental mechanisms and protocols that blockchain technology implements to help better understand how this technology works and why it makes sense for certain applications. Next, I plan to demonstrate the social impact of this disruptive technology through my STS paper and navigate whether the positives of this revolutionary computing model outweigh the negatives, or vice-versa.

Blockchain Technology: A Decentralized Future

The technical research paper will ideally provide an accurate, comprehensive, yet sufficiently nontechnical description of the blockchain it can be readily understood by an individual without prior knowledge on the subject. Because technology in the modern business space is changing so rapidly, many corporations are having difficulty keeping up with emerging technologies. More specifically, with the emergence of blockchain and the movement towards web3, users have the ability to control and own their own data. This presents a fundamental shift away from the current standard of massive companies owning the data of individual users. With all of the social media buzz and plethora of misinformation online, it can be difficult to traverse through and gather information on how blockchain actually works. As mentioned by Yawar and Shaw, "Since its introduction, blockchain technology has been revered, ridiculed, dismissed, embraced, and presently has become too large to ignore, witnessing exponential growth" (2022, p.14). Unlike many other emerging technologies, blockchain has been scrutinized as a sort of pseudo technology due to its apparent correlation with Bitcoin, which has been extremely volatile and subject to lots of negative press. However, unbeknown to the general populace, there are hundreds of applications of blockchain technology that have not yet been implemented. As this technology starts getting more and more integrated into various systems, the importance of understanding it will increase dramatically within the world of business and government alike.

To briefly outline my technical research paper, its contents will lie on a spectrum of technical complexity, starting with high level considerations of the advantages of decentralization followed by a detailed description of blockchain mechanics outlined in the original Bitcoin whitepaper. Next, I will compare Bitcoin to Ethereum before commencing a deep dive into the various categories of derivative applications which the protocols have enabled,

specifically smart contracts and decentralized autonomous organizations (DAOs). It is important to note, however, that this technology is improving and changing rapidly. As mentioned by Wang et al., "with the continuous development and application of blockchain technology, the academic and commercial circles are constantly exploring the research directions and practical applications of blockchains" (2019, p. 191). From money transfers, smart contracts, healthcare, government, and even personal identity security, the potential impact of blockchain applications is enormous. In fact, "recently, researchers have published a variety of works in the fields of IoT for eHealth, smart cities/home, supply chain, agriculture and industries by leveraging blockchain technology" (Uddin et al, 2021, p.2). However, a "variety of technological and security issues… remain unaddressed" (Uddin et al, 2021, p. 43). In any case, the global market for blockchain technology is swiftly growing and is expected to continue to do so in the future. Hence, the increasing importance for business owners and government officials as well as the general public to understand the underlying infrastructure of blockchain technology.

Blockchain and Social Impact

The STS paper I will be working on will focus on the social influence that blockchain technology has presented as well as its potential future impact on society. This is a very interesting discussion, especially in the current climate given the dramatic rise of blockchain technologies in the past few years. "The potential of blockchain technology to radically transform interactions should raise critical questions for governments and society" (Justinia, 2019, p.289). Blockchain has the disruptive power to completely change the healthcare, biomedical, and financial industries, to name a few. Moreover, blockchain can not only help track social impact but help to shape it. Earlier this year, Ethereum co-founder Vitalik Buterin donated $1 billion of cryptocurrency to support India's Covid-Crypto Relief Fund. The transaction was verified by a blockchain-backed digital wallet that showed the transaction.

Imagine holding governments to spending pledges and tracking charity's disaster relief and aid distribution work. Big tech companies keep their algorithms secret, whereas blockchain's selling point is openness and irrefutable record keeping. With blockchain applications "users are not required to trust any third-party and are always aware of the data that is being collected about them and how it is used" (Zyskind et al, 2015, p.184). In addition, the blockchain recognizes the users as the owners of their personal data. "The rise of self-sovereign identities (SSIs) based on blockchain technologies provides individuals with ownership and control over their personal data and allows them to share their data with others using a sort of digital safe" (Benchaya et al, 2022, p.402). Companies, in turn, can focus on utilizing data without being concerned about properly securing and compartmentalizing them. These developments change the relationship between government, companies, and individuals. Some technologists claim that blockchain and cryptocurrencies can realign capitalism thanks to blockchain's alternative trust-based, peer-to-peer systems. With its tracked, audited, and publicly communicated information, blockchain may be able to rebuild the bridges between centralized systems and the people they serve. Verifiable timestamps, geolocations, and supply-chain records can help citizens provide more access to certifiable information.

Scholars and engineers alike remain unclear about the societal impacts that this technology may bring about. Despite the profound technological innovation linked to this technology, uncertainties, and speculation on the potential scenarios still animate the industrial and scientific dialogue. As Levis asserts, "in particular, it is not yet clear which applications will see the light, and, eventually, what effects these changes will have at a societal level" (2021, p.1). While the exploitation of blockchain technology can yield tremendous benefits, not all global nations are have the same outlook with regards to adopting it. Some countries have been more accepting of the technological change this particular tech can provide, while others are lag behind. Additionally, concerns about energy consumption as it is estimated that Bitcoin

consumed electricity at an annualized rate that exceeded the entire annual electricity

consumption of Norway. On the other hand, blockchain technology seems to have the power to

make financial institutions much more accessible. As asserted by Merrell, "Blockchain offers the

opportunity to offer financial services without the need for a bank, known as decentralized

finance (DeFi)" (2022, p.3). Protocols already exist that offer loans, savings accounts, and

insurance policies without the need for banks or brokers, with liquidity provided by the

community. As with all new technologies, "there is no consensus on its potential value, with

some people claiming that it will bring more disruptive changes than the Internet and others

contesting the extent of its importance" (Makridakis et al, 2019, p.1). As a general framework

for this paper, I will discuss the various benefits and downsides of this technology on society

using historical examples and ethics to back up my claims. The paper aims to reach a conclusion

on whether the advantages outweigh the disadvantages of blockchain technology with regards to

its impact on society.

Conclusion

My technical paper will explore the fundamentals of blockchain technology in order to

aid individuals without prior knowledge gain a solid understanding of the topic. My STS paper,

on the other hand, will dissect the past, current, and future social impact that blockchain

technology will have on its overall benefit to society. Due to the novelty of this technology, I

hope to make blockchain a more transparent topic and create an unbiased dialogue on the

potential of this technology. Through my anticipated research, I hope to reframe my STS

problem to be more specific, focusing on different industries and how they will be affected. In

any case, blockchain technology will undoubtedly alter the social, political, and economic fabric

of the modern world.

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