The Paradoxical Effects of Blockchain Technology on Social Networking Practices

Completed Research Paper

Raffaele Fabio Ciriello
IT University of Copenhagen
Business IT Department
Rued Langgaards Vej 7
2300 Copenhagen S, Denmark
raci@itu.dk

Roman Beck
IT University of Copenhagen
Business IT Department
Rued Langgaards Vej 7
2300 Copenhagen S, Denmark
romb@itu.dk

Jason Bennett Thatcher
University of Alabama
Culverhouse College of Business
Tuscaloosa, Alabama, US
jbthatcher1@culverhouse.ua.edu

Abstract

Blockchain technology is a promising, yet not sufficiently well understood enabler of large-scale societal and economic change. For instance, blockchain makes it possible for users to securely and profitably share content on social media platforms. In this study, we explore how blockchain enables and constrains social networking practices by means of an in-depth qualitative study of Steem, a major Blockchain Social Network (BSN). From that, we identify three paradoxical effects of BSN: 1) Freedom and Captivity, 2) Abundance and Scarcity, and 3) Peace and War. Via a dialectic synthesis of the three paradoxes, we theorize the effects of blockchain technology on social networking practices. We discuss theoretical implications for research on blockchain, social media, and online communities and define a path for research on BSN. We also discuss theoretical and practical implications by illustrating the paradoxical effects of using BSN and suggesting appropriate coping strategies.

Keywords: blockchain, social networks, steem, paradox, practices, social media

Introduction

Social media platforms have experienced massive growth in membership. Facebook alone had more than 2.2 billion monthly active users (Statista, 2018). Social media firms have turned to generating revenue from selling advertising, aggregated user data, and insight into social media users to sustain the platform. While not all social media are profitable (see for example Twitter), successful platforms reap substantial net income, with Facebook alone collecting 15.9 billion US dollars in 2017 (Statista, 2018).

While users joined social media to connect with others, they are increasingly aware of that their data is not well protected and has been monetized for the benefit of others. Perhaps, the most striking illustration of this tension is the recent Cambridge Analytica security breach (The Guardian, 2018). User data was shared without consent in a manner that generated substantial benefit for organizations in the Facebook ecosystem. While the Cambridge Analytica breach appears to have not harmed Facebook's membership growth, its aftermath has created a general skepticism toward social media platforms.

Consequently, an increasing number of critics have called for users to stop or boycott major social media platforms. Citing Facebook's push to monetize data at all costs, for instance, Apple's co-founder Steve "Woz" Wozniak announced he was leaving Facebook, as the platform simply had not realized its potential to create a secure environment for social interaction (CNBC, 2018). Ironically, the initial promise of decentralized and secure information sharing, led to centralization of profits, power, and control in a few social media platforms and offered little more than "likes" as compensation to users. While social media platforms such as Facebook, Twitter, Instagram and the like, are barely entering their second decade, a study published by Forbes magazine suggests that user engagement on Facebook dropped by 30 % annually in the last years (Forbes, 2017a).

Given distrust in platform providers, declining use, and the growth of new technologies, some suggest that we are at the brink of entering a post-social media era, where we will see new forms of secure social interactions and value distributed across all users of platforms (Forbes, 2018, 2017b). Citing blockchain startups like Steem (steem.io, steemit.com), they point to the potential of decentralized, user-controlled social media that also allows for compensating users for valuable contributions. Simply put, rather than benefiting just a few owners of social media platforms, blockchain technology makes it possible for users to share data in a secure and profitable way.

A Blockchain Social Network (BSN) can be defined as a decentralized social media platform that provides a reward mechanism for the creation, curation, and consumption of user-generated online content, here understood as social networking practices. Through their contributions, users gain reputation and wealth in form of tokens. Very similar to cryptocurrencies, those tokens are exchangeable and can be converted into fiat money, such as US Dollars. In other words, BSN are instantiations of a blockchain economy that allow for protecting intellectual property while enforcing a revenue model that operates on a global scale. As such, BSN may have unprecedented effects on social networking practices that require forward-looking critical reflections. Our aim is to study how BSN are shaping social practices in globally distributed and decentralized communities. Thus, we raise and address the guiding research question:

How does blockchain technology enable and constrain social networking practices?

Through an exploratory qualitative study at Steem, a major BSN platform, we dialectically synthesize three paradoxical effects, namely 1) Freedom and Captivity, 2) Abundance and Scarcity, and 3) Peace and War. We theorize the paradoxical effects of blockchain technology on social networking practices and discuss implications for theory and practice.

The remainder of this paper is structured as follows. We summarize the background literature on blockchain technology and characteristics of BSN in the following chapter. Next, we introduce our research approach and our use of paradoxes as analytical lens. In the results section, we present the empirical results of our study in the form of three opposing theses and antitheses, followed by a dialectic synthesis of the paradoxes and a discussion of their theoretical and practical implications. The paper concludes with summing up the key takeaways of the study.

Literature Background

Blockchain Technology

Blockchain technology has gone a long way since an anonymous individual or a group of people under the pseudonym Satoshi Nakamoto released the Bitcoin white paper in 2008 (Nakamoto, 2008). Bitcoin became one of the first and most widely known instantiations of a blockchain-based payment system but its underlying technology, blockchain, enables an array of applications aside from payments (Nærland et al., 2017). Blockchains use smart contracts to execute decentralized governance system (cf. Beck et al., 2018) within distributed user communities to manage and reward content creation, curation, and consumption. At the same time, smart contracts can protect individual property rights, enforce revenue streams, and may resolve network issues by a voting mechanism to resolve them without depending on trusted centralized authorities.

A blockchain consists of a virtual chain of blocks, each of which contains a unique identifier (called hash) and information such as monetary transactions, contracts, or other documents as well as a unique identifiers. A blockchain runs on an intermediary-free distributed network of computers (called nodes) who collectively validate the information to go into a block or not. Reaching a consensus of what information to place in the block is necessary to minimize the possibility of accepting incorrect

information, as the majority of nodes would reject the block without the need for a central entity (Peters and Panayi, 2016). A malicious actor who tries to override the blockchain would require a significant amount of computational power, which in theory is possible but with today's technology considered prohibitively expensive. Due to this distributed network of trusted nodes, the blockchain technology eliminates the need for a 3rd party intermediary to validate peer-to-peer transactions, thereby enabling secure and transparent transactions operating on a decentralized network (Samelson, 2017).

Characteristics of Blockchain Social Networks

While social media and its commercial applications are established (Benthaus et al., 2016), Blockchain Social Networks are an emerging class of social media platforms. Thus, to clarify the effects of blockchain technology on social networking practices, it is first necessary to identify its characteristics in this context. We focus our analysis on Steem, a major BSN. Launched in 2016, Steem has a user base of about 1 million registered accounts and a market capitalization of up to 2 billion USD (CoinMarketCap, 2018), making it one of the first and largest BSN of its kind. Other notable examples of BSN include Synereo, Nexus, ReddCoin, Minds, InDorse, and Dock.

Steem is built on three principles: 1) Everyone who contributes to a venture should receive ownership, payment, or debt from the venture. 2) All forms of capital are equally valuable, so members who contribute their time and attention to the platform are as valuable as those who contribute cash. 3) A community produces products to serve its members (Larimer et al., 2017). Based on analysis of white papers, news articles, and Steem-provided documents, we identified six characteristics of Steem: *1) Openness, 2) Irreversibility, 3) Decentralized Rewarding System, 4) Incentivized Mutual Evaluation, 5) Rate-limited Weighted Voting, and 6) Public Reputation System*.

Openness: Steem is an open source social media platform that enables the creation, curation, and consumption of multimedia content. Content creation and curation require registering for a Steem account, but content is openly accessible for unregistered users. Account creation is free to anyone regardless of age, gender, and social, regional, or ethnic background. Moreover, Steem is a public and permissionless blockchain database, where block producers (so-called witnesses) are elected by the community of Steem users. The blockchain database itself can be accessed by an unbounded number of user interfaces, and there are already over 50 Steem interfaces and related projects. Furthermore, the creators of Steem announced to release the so-called Smart Media Token (SMT) platform, which aims at enabling publishers to create customized tokens that help monetize content and grow communities (SMT Whitepaper, 2018).

Irreversibility: Due to the immutability of transactions on the public-permissionless Steem blockchain, all content is stored permanently once posted on Steem. This includes upvotes, flags, follows, unfollows, posts, re-shares, comments, token transfers, account balances, and other kinds of user trace data. Blockchain explorers, such as steemdb.com and steemd.com, allow everyone to analyze that data.

Decentralized Rewarding System: The Steem blockchain uses a decentralized rewarding system that calculates the value of contributions via three native tokens:

- *STEEM:* The STEEM token is a liquid cryptocurrency that Steem users can transfer to each other as a form of payment. STEEM is the fundamental unit of account on the Steem blockchain from which the other tokens derive their value. STEEM can be traded for other cryptocurrencies on external exchanges.
- *STEEM Power (SP):* SP is an access token that grants its holders voting power within Steem. Users can convert their STEEM into SP by committing them to a vesting schedule - a process called *powering up*. SP is non-transferable and can only be withdrawn by converting the SP back to liquid STEEM in 13 equal weekly payments - a process called *powering down*. Users can delegate their SP to others, allowing the receiving user to use their voting power while keeping the SP in their own account.
- *Steem Blockchain Dollar (SBD)*: The SBD is designed to provide a cryptocurrency with stable value. SBD are created by a mechanism similar to convertible notes, which are short-term debt instruments that can be converted to ownership at a rate determined in the future. STEEM can be viewed as ownership in the Steem community whereas SBD can be viewed as a debt denominated in any commodity or currency.

According to the official website (steem.io), the Steem blockchain has paid out over 40 million US dollars' worth of token rewards to users around the globe. Steem rewards contributions with cryptocurrency,

enabling creators to monetize their content. The Steem blockchain has a Delegated Proof of Stake (DPoS) consensus mechanism where users with a high stake have more power over the distribution of the tokens than users with a smaller stake. Contrary to blockchains with a Proof of Work mechanism, such as bitcoin, tokens in a DPoS blockchain are created at a fixed rate, in the case of Steem every three seconds. The Steem blockchain creates new tokens at a decreasing inflation rate, currently at 9.5% per year. The inflation rate continues to decrease by 0.5% per year until it reaches a stable rate of 0.95% in the year 2037. Out of the total supply of created tokens, Steem allocates 10% to the block producers and 15% to holders of STEEM Power. The remaining 75% of generated tokens are allocated to the reward pool (Steem Bluepaper, 2017).

Incentivized Mutual Evaluation: Steem incentivizes users to constantly, openly, and transparently evaluate each other. Users can earn a share of the reward pool by creating content and curating content, here understood as posting and upvoting. The Steem blockchain utilizes a community-based voting mechanism whereby the users are incentivized to collectively determine how much an author should be paid for a post. 75% of the post payouts go to the post creator, the remaining 25% are split among the post curators. That means that users do not have to pay out of their own pocket to reward authors. Instead, users "get paid for figuring out who should get paid" (Larimer et al., 2017, p. 29).

Rate-Limited Weighted Voting: Users have a fixed daily allowance of votes that they can use to increase the value of a post by upvoting it. The blockchain utilizes the number of upvotes, weighted by SP, to determine how much of the reward pool gets distributed to a post. Every full vote drains 10% of the remaining voting power, but partial voting is possible (e.g., 10 votes at 100% voting power or 20 votes at 50% voting power, etc.). Voting power automatically recharges at 20% per day. In addition, users can use their voting power for flagging content. Flagged content will be hidden from the user interface, but it will still remain permanently stored on the blockchain. Content creators who get flagged face reduced earnings and decreasing reputation scores, but they cannot be prevented from posting on the blockchain.

Public Reputation System: Steem has a reputation system that calculates a user's incoming votes to determine their level of influence, their visibility, and ultimately their financial earnings on the platform. Everyone's reputation score, account balance, even individual post payouts and transactions are publicly and prominently displayed as status indicators for everyone else to see, including non-registered users.

Research Method

To gain novel insights from analyzing the effects of blockchain technology on social networking practices, we conducted an exploratory qualitative study at the major BSN Steem to obtain a rich understanding of the phenomenon from a participant's perspective. We took an iterative approach to data collection and analysis until a coherent picture emerged, moving back and forth between theories and the different interpretations of the field material that we obtained from social constructions, such as language, shared meaning, documents, tools, and other artifacts (Klein and Myers, 1999). Following principles of interpretive field research (Walsham, 2006, 1995), we iteratively refined emerging concepts through systematic data generation and conceptualization.

Relationship with the Research Site

Our engagement with the research site followed an unconventional approach, since there was no well-defined company or organization where we could conduct interviews and observations. Inspired by virtual ethnography studies (e.g. Sarker and Sahay, 2004), we initiated our research process by formulating the problem (Van de Ven, 2007), designing the field study (Walsham, 2006), and engaging in intertwined data collection and analysis to generate theoretical insights from our data. We chose a single case study to be able to study the phenomenon in depth. Our data sampling methods were closely aligned with our preconceptions about opportunities and challenges in blockchain ecosystems but were otherwise open to allow for the analysis and emergence of new theoretical insights (Walsham, 2006). This paper's specific research question emerged according to our deepening understanding and data conceptualization.

Data Collection

In collecting our data, we iteratively selected, collected, and analyzed data slices according to what was necessary to construct the emerging theory (Walsham, 2006, 1995). Following the idea of triangulation (Silverman, 2006, p. 291), we relied on multiple sources of evidence to integrate multiple interpretations into a coherent picture (Klein and Myers, 1999). This included interviewing selected participants, as well

as collecting and analyzing Steem posts and other online interactions between users, such as comments and chats. For instance, we read a number of posts, which some of the interview participants sent us or mentioned during the interview, to obtain more background information about the participants and stay informed about relevant discourses on Steem. The first author of this paper was responsible for collecting all data from Steem to ensure consistency in the data collection process.

In order to interview people who are current active users and reasonably experienced with using Steem, we selected interview partners with a Steem account older than 3 months, a reputation level higher than 50, a minimum of 250 STEEM Power, and minimum 300 total posts, out of which minimum 30 posts had to be created in the last three months. We conducted 13 appreciative interviews via Skype video call, ranging from 30 to 90 minutes. In appreciative interviewing, questions are framed to evoke reflections on personal experiences, setting the stage for imagining pathways to desirable futures (Schultze and Avital, 2011). The sessions started with a retrospective discovery of the participant's past experiences with using Steem. The interview gradually developed into a prospective discussion of how the use of Steem could be improved to better support social networking practices.

Table 1 - Overview of Interviews

Total #	User Category	Gender	Residence	Occupation	Duration (minutes)	Codes
13 Inter-views	Content Creator: 10 Content Curator: 7 Core Developer: 5 Platform Innovator: 4	Male: 8 Female: 5	Europe: 6 America: 5 Africa: 1 Asia: 1	Steem as full-time employment: 9 Steem as a part-time activity: 4	Total: 704 -Avg: 54 -Min: 30 -Max: 90	Total: 1050 -Avg: 80 -Min: 37 -Max: 157

By interviewing a wide range of participants with different roles and from different units, we could document multiple interpretations of the actions under study (Klein and Myers, 1999). Table 1 provides an overview of the interviews. Users could fall into multiple different categories, including:

- *Content Creators:* People who create original content and publish it on the Steem blockchain. Includes artists, photographers, musicians, writers, bloggers, vloggers, etc.
- *Content Curators:* People who browse, collect, compile, and share original content published on the Steem blockchain. Includes contest organizers, curation services, etc.
- *Platform Innovators*: People who build innovative services on top of the Steem blockchain. Includes contributors to Steem-based services.
- *Core Developers*: People who power the Steem blockchain and actively develop it further.

We used a semi-structured interview guide to ensure topical focus and consistency, while allowing respondents to freely express their own views (Walsham, 2006). All interviews were recorded and transcribed to capture a full description of what was said and facilitate later in-depth analysis, which allowed us to step back and assess the interpretations of the fellow participants in detail (Walsham, 1995).

Data Analysis and Interpretation

We analyzed the collected data via qualitative techniques (DeCuir-Gunby et al., 2011). We used a transcription service to transcribe the interviews by following a denaturalized approach, focusing on meaning rather than interviewees' accents (Weston et al., 2001). We cross-checked the transcriptions and imported them into the qualitative data analysis software MAXQDA to initiate an iterative and intertwined process of data-driven coding and theory-driven coding (DeCuir-Gunby et al., 2011). Our data-driven coding process started with generating 1050 tentative data-driven codes from the interviews which we grouped into more aggregated themes. Next, we moved back and forth between data-driven and theory-driven coding by making connections between the emerging themes and related literature on BSN and paradoxes to construct a comprehensive scheme (DeCuir-Gunby et al., 2011). We focused the subsequent analysis on reviewing and revising codes in the context of data and theory. This led us to relate the theory-driven and data-driven codes to one another, through which we realized that BSN offer an array of enabling and constraining characteristics that can lead to ambivalent practices. Thus, we identified the paradoxical effects of BSN as our core category. Consequently, we adopted a paradox lens to dialectically examine the ambivalent effects of blockchain technology on social networking practices, as we explain in the following.

Using Paradoxes as Analytical Lens

Schad et al. (2016, p. 10) define paradox as "persistent contradiction between interdependent elements". This definition emphasizes two properties of a paradox: 1) contradiction between two underlying propositions (A and B) that seem plausible individually but impossible when juxtaposed, and 2) the necessity of responding with coping strategies that embrace the tension simultaneously (Smith and Lewis, 2011). Poole and Van de Ven (1989, p. 565) advocate four such coping strategies: 1) acceptance – keeping A and B separate and their contrasts appreciated, 2) spatial separation – situating A and B at two different levels of analysis, 3) temporal separation – switching between A and B in the same location at different points in time, 4) synthesis – finding a new perspective that eliminates the opposition between A and B (cf. Smith and Lewis, 2011, p. 385).

In information systems (IS) research, paradoxes have been used as rhetorical devices to create appealing tension of the irony and dilemma that digital artifacts embody. For instance, IS scholars have identified paradoxical tensions in the promoting and impeding role of IT in organizational change (Robey and Boudreau, 1999), in the intended and unintended consequences of mobile technology usage (Jarvenpaa and Lang, 2005), the ambidextrous management of IT transformation programs (Gregory et al., 2015), and in the paradoxical effects of digital artifacts on innovation practices (Ciriello et al., 2018).

Despite this growing interest, paradoxes remain a nascent field of study, in which much work is interpretive and exploratory (Smith et al., 2017). Unlike logical paradoxes, which have deep historical roots in Eastern and Western philosophical traditions, socially constructed paradoxes oppose elements that are often somewhat vague, where contradictory elements are embedded in material artifacts, practices, and arrangements (Hargrave and Van de Ven, 2017). Instead of striving for harmony and consistency, looking for theoretical tension and using it in a creative way creates an opportunity to develop more encompassing theories that capitalize on the duality and generative force of paradoxical tension (Eisenhardt, 2000).

Coping with such paradoxical tensions requires people to develop special cognitive abilities, indicating that the paradoxes to be dealt with consist of tensions between distinct yet unified opposed elements that people can often only cope with, rather than resolve (Hargrave and Van de Ven, 2017). We therefore adopt a paradox lens to illustrate the ambivalent practices enabled by blockchain technology and suggest appropriate coping strategies through a dialectic synthesis of the opposing poles.

Results: How Steem enables and constrains social networking

In this section, we identify three paradoxes from the insights obtained in our study and frame each paradox with a short summary. Afterwards, we dialectically examine it, supporting both its thesis and antithesis with data collected at Steem.

Paradox P1: Freedom and Captivity

From studying social networking practices on Steem, we learned that a BSN can provide freedom and captivity. In this context, freedom is understood as enabling censorship-resistant freedom of speech and creative expression, while captivity is understood as holding people captive in self-exploitation, dependence, and addiction.

Thesis T1 (Freedom): Steem's openness and irreversibility enable censorship-resistant freedom of speech and creative expression.

As we learned from our study, users can freely express themselves and share whatever content they want on Steem without the threat of any potential kind of censorship. Many users switched to Steem because they felt restricted in their freedom of speech on other social media platforms. Several participants point to experiences where they have seen content, users, and entire communities being marginalized or even removed from social media platforms by a central authority. For instance, one participant criticizes Facebook, Twitter, and YouTube for shadow-banning users as well as demonetization and censorship of content based on rules that are defined by a company and often intransparent for outsiders and users.

> *"Somebody in a boardroom is making a decision about what people can freely discuss on YouTube. And if you are out of the bounds of a loud conversation, your content is now demonetized. So whether that's censorship or not, the effect is, that content stops being produced there."* [i1, Core Developer, USA]

In contrast to centrally governed social media platforms, the visibility and monetization of content on Steem follows community-based mechanisms that are transparent for everyone to see in the blockchain.

> "*On Steem, those are community decisions by community rules that are transparent on the blockchain. (...) So ultimately, I can go share whatever I want on this blockchain and have it stored immutably, forever, as long as Steem exists. And for that reason, I think that it is a bastion of free speech(...). I feel like my voice is protected along with everybody else's.* " - [i1, Core Developer, USA]

Our data further shows that this censorship-freeness makes Steem particularly attractive in places with restricted freedom of speech and internet censorship, because the Steem blockchain is essentially just a distributed database that can be accessed by an open ended number of platforms - and there are already dozens of Steem interfaces. As two participants explain:

> *"They can't really ban it in China. (...) It's something that, even when you ban it, it doesn't really go away. (...) The Steem blockchain gives me direct, live access to better quality content, but it also enables me to have the possibility to have better and deeper interactions with people who create that content.*" [i9, Content Creator, China]

> "*You have the decentralized database, and you can basically decide which gateway you use to access the database. Let it be Steemit.com, let it be Busy.org, or any other platform. So with one account, you can go on all these platforms, you can use it, and also all the Steem power you gain, you can use it on any platform.*" [i10, Content Curator, Netherlands]

Some users see improved copyright attribution as another positive side effect of the immutability of content on Steem, because content creators are able to point to a public record with timestamp showing proof that the content originated from a particular user at a particular point in time.

> "*For me, it's as good as copyrighting. It's just a free and open platform. So anything I put on there (...) belongs to that account. As long as nobody has the keys to that account, that's my account.*" [i9, Content Creator, China]

In sum, there is significant engagement and enthusiasm among Steem users, who see potential in BSN to provide users with greater freedom than centrally governed social media platforms.

> "*It forces you to think for yourself. (...) In a sense, being part of a decentralized organization like Steem helps you understand that the consequences you experience in your life are based on what you do, not on what others are doing.*" [i5, Core Developer, Romania]

Antithesis AT1 (Captivity): Steem's irreversibility, incentivized value distribution, and mutual evaluation system can hold people captive and can lead to self-exploitation, dependence, and addiction.

As we learned from our study, the immutability of the Steem blockchain lays a foundation for freedom of speech, it also opens opportunities for malicious actors to spread problematic content. While we have not observed malicious behavior on BSN, such abuses have occurred on blockchain applications. If someone wants to engage in cyber crimes, there is virtually no mechanism in place to prevent that. In addition, like other cryptocurrencies, the Steem cryptocurrency resists central regulation and can be used to fund illegal activities. Some respondents point to thinkable scenarios of abuse of Steem, as one participant explains:

> *"I like the idea behind not being able to censor things, but the negative consequence is that people can just put up whatever they want, and you can't do anything about it. (...) So if you're going to put pornographic pictures of kids up, they're up there. You can't take it down. And because of the anonymity, you can't necessarily find those people that are putting it up either.*" [i3, Content Curator, Panama]

In addition, Steem's irreversibility may make users feel captivated by the lacking possibility to edit or delete content at a later point in time. Users may regret things that they posted at some point, but there is no way to change the past on Steem. As one participant explains:

> "*The negative thing is that you can't delete anything. Nothing ever gets deleted. Whatever you post on Steemit will never be deleted. Everybody can see everything you have, what you do with your money, whom you send it. It's completely transparent. I think it's a good thing, but at the same time if, let's say, I wanted some privacy, you can't really have that.*" [i2, Content Creator, UK]

This may at some point also clash with data protection regulations, such as the "right to be forgotten"[1] rule that is implemented in various states. The only moderation mechanism in place is the flagging system, which enables users to hide content from being displayed in the user interface, but the content itself will remain permanently stored on the blockchain. While content creators who get flagged face negative consequences, such as reduced earnings, they cannot be prevented from posting. Yet, our respondents seem optimistic and unconcerned about this issue, as they think of it as a tradeoff of freedom of speech, which would not be limited to Steem only. Other respondents argue that Steem's incentive mechanisms prevents malicious behavior more effectively than other platforms:

> "*I think that, when you live in a free society, there are going to be some bad actors, and you have to figure out ways to deal with them. Mostly, that's by making sure that they earn no rewards, that their posts are hidden, but I don't think that's a problem just to Steem. You can post these things in other places. So, I think the trick is to go teach people a better way of life (…) and show them that there are positive financial implications if you are posting thoughtful content.*" [i1, Core Developer, USA]

Our data shows that the monetary incentive mechanisms of Steem can be highly captivating, too. On a platform that pays people for their contributions based on the peer evaluation by a community, it is likely that users become financially and emotionally dependent on monetary rewards and forms of gratification, such as likes and comments. Steem is still too new to make statements about the long-term effect of such incentives on users, but it is thinkable that they can lead to addictive behavior found on other social media platforms. Many respondents state that they spend a considerable amount of their time on Steem, often even exceeding the amount of time they would actually like to spend on it:

> "*I feel bad when I feel like I should be on Steemit instead of doing something else.*" [i9, Content Creator, China]

> "*Steemit has become a huge portion of my life. It's actually a little shocking. (…) I've never seen something like this.* "[i4, Core Developer, Canada]

> "*I spend too much goddamn time on it. I am on Steemit way too much.*" [i12, Content Curator, USA]

Some respondents are particularly concerned about the effects of Steem on young people who have not yet finished their education:

> "*Steemit is time consuming. When students join, it takes much of their time and allows them to forget about their education. So, when they start earning from Steemit, the drive for education will no longer be there.*" [i7, Content Creator, Nigeria]

Other respondents point to another problematic practice whereby Steem acts as a gateway to cryptocurrencies. While Facebook and Google have recently banned cryptocurrency advertisements, some frequently discussed topics on Steem are cryptocurrencies, market trend analyses, ICOs, buy/sell recommendations, and the like. Many respondents report that Steem was their first cryptocurrency, and that they soon thereafter invested in other cryptocurrencies. In many instances, these posts are overly optimistic and lack basic information on the financial risk involved in investing in cryptocurrencies.

> "*Steem was my very first crypto that I ever got into. And then bitcoin. And since then I've invested in all kinds of crypto. I've got a whole portfolio. And it's all because of Steemit. So Steem has basically opened a whole new door to me.*" [i11, Content Curator, Mexico]

Paradox P2: Abundance and Scarcity

From studying social networking practices on Steem, we learned that a BSN can provide abundance and scarcity. In this context, abundance is understood as enabling people to turn their passions into a profitable profession, while scarcity is understood as enabling highly skewed distribution of wealth that can lead to a high dependence of most users on a few wealthy others. The decentralized rewarding system in Steem has the potential to provide people around the globe with access to greater financial autonomy but tends to favor few actors with a higher stake, potentially leading to a *rich get richer* problem or, in the worst case, financial collapse.

[1] cf. https://en.wikipedia.org/wiki/Right_to_be_forgotten

Thesis T2 (Abundance): Steem's decentralized rewarding system can lead to abundance by enabling people around the globe to turn their passion into a profitable profession.

Steem's decentralized rewarding system utilizes the wisdom of crowds to calculate and automatically distribute that value to the contributors in the form of cryptocurrency. Users can earn a share of the reward pool by posting and upvoting. Users have a daily allowance of 10 votes that they can use to increase the value of a post by upvoting it, so they do not have to pay out of their own pocket to reward others. As a result, content creators and content curators can earn financial rewards for their social media content. This could enable social media users to receive an income for their online activity, as one journalist explains:

> "*The main advantage is that you're getting paid to like things and you're getting paid to create things instead of Facebook being paid for it. (...) I know how hard it is to make money from ads, sponsorships, and affiliates. And suddenly, you can make money just from getting likes. (...) Overall, Steem can contribute a lot to the democratization of content. (It could become) a global magazine that incentivizes quality content. (...) I think society is going to change, social media and the way people produce content online is going to change.*" [i13, Content Creator, Israel]

In our interviews, we learned that a number of Steem users earn substantial income from creating and curating content. Many users have previously built up a large followership on other social media platforms but migrated to Steem because substantially higher rewards that are paid there. A food blogger and an independent singer/songwriter, who generate income in the five to six figures range on Steem, explain:

> "*I've been a food blogger for nearly five years, (...) I've reached 5 million views on YouTube, I've got 300,000 subscribers, and I'm now making like $100 a month there [laughter]. And that's the point when I realized: The system is broken, you're never going to make money. So Steem has changed my life because I now get paid for my work. It really just made me feel appreciated.*" [i2, Content Creator, UK]

> "*I had to really hustle to make money before. I was getting my music into films, and into television, licensed radio. But it takes so much work just to get a paycheck from these labels I was working with. And now, I can do that. I'm now able to fund my dreams.*" [i12, Content Curator, USA]

There is considerable excitement among participants about Steem enabling them to turn their passion into a profitable profession. A number of participants mention that they are now able to make a living by monetizing their creativity. Many even quit their job in order to work full-time on Steem.

> "*Steem enables you to do things that you love. As long as you find a way to add value, the platform will reward you, and it will enable you to spend time doing things that you actually like.*" [i10, Content Curator, Netherlands]

> "*I quit my job and I've been living on Steem since then. (...) It has changed my life fundamentally in a financial way, but also it's just really great to see that people can monetize their creativity.*" [i11, Content Curator, Mexico]

> "*We are social animals. We want to connect, share, and contribute to a common social good. (...) And Steem is a really great concept because you can do what you love, be it writing, programming, gardening, anything you want to contribute to the people. If users see value in it, then you get rewarded.*" [i8, Core Developer, Lithuania]

Our data also shows that the content creators are not the only ones who can earn substantially on Steem. Some content curators have reached high earnings by organizing contests and competitions. For instance, our interview sample includes founders and core team members of the Steem photography contest, the Steem open mic contest, the Sounds of Steem radio, and the Steem ultimate writing challenge. These are user-driven contests where content creators can submit their contributions, be it photography, music, or writings, and win a monetary prize that is paid out of the earnings from the contest, plus their own post payout. Many of these contests get hundreds or even thousands of entries per round.

> "*I started looking at who was doing really well on the platform, and I realized it were people who were contributing or helping others more than just talking about themselves.*" [i11, Content Curator, Mexico]

> "*You know how much it means when somebody really appreciates your music and your song. And seeing that there were all these artists on Steem, I decided to do this compilation, and I got tons and*

tons of entries. (...)I'm giving all the post profits to the artists themselve, purely just to promote and encourage them to keep making music." [i12, Content Curator, USA]

As we learned during the interviews, the distribution of value via Steem is not limited to users from industrial nations only but also reaches people in emerging markets already, where it may spark substantial economic development.

"*Steem has actually changed lives and I believe it's still going to do better. In my case, I've used my Steem earnings for a lot of things. I was able to get more animals on my farm through my Steemit earnings, (...) I got a laptop, I bought a phone, which I never imagined I was going to buy. I've used my earnings to get myself clothes, shoes, a lot of things. Before, I was living a broke life, but through Steem I am able to travel now.*" - [i7, Content Creator, Nigeria]

Many users earn substantial rewards from using Steem. Some envision far-reaching political and economic consequences of the decentralized attention economy enabled by Steem:

"I'm going so far to say, it is an intrinsic threat to centralized governments, because their power mostly stems from the ability to print money at a whim and do that as debt. (...) That system is causing a scarcity mindset. (...) And here, we now have an alternative. We are able, through cryptocurrencies, to find a medium of exchange that is transparent on a public ledger by rules we all agree to. I think this is one of the most financially liberating things the world has ever seen. " [i1, Core Developer, USA]

Antithesis AT2 (Scarcity): Steem's incentivized mutual evaluation system enables a highly skewed distribution of wealth and can lead to a high dependence of most users on few wealthy others.

We learned from our study that the distribution of wealth on the Steem blockchain is highly skewed and most of the tokens are allocated to a very small percentage of users. Users with a higher stake of SP have a higher voting power and thus also a higher influence on the distribution of the token supply. Users can also increase their stake by voting for themselves. In addition, users can delegate their SP to others, which enables the formation of voting alliances that draw from a shared pool of voting power.

Within the Steem community jargon, users are informally divided into *minnows, dolphins,* and *whales,* indicating the size of their stake. Users with a stake smaller than 5000 SP are considered *minnows*. Their vote value is worth a few Steem cents, up to about 0.32 STEEM cents at the 5000 SP boundary. *Dolphins* have a stake between 5000 SP and 500.000 SP, with a vote value of up to about 32 STEEM at the upper boundary. Above that, users are considered to be *whales*. The wealthiest whale in the pond is the @steemit account that holds about 44 million SP, enough to increase the value of a post by several thousands of STEEM with a single vote. As of May 2018, there are in total 961.707 users on Steem (steemdb.com/accounts), out of which 37 are whales (0.0038 %), 1928 are dolphins (0.2%), and the vast majority are minnows, namely 959.742 users (99.79 %).

During our interviews, it came evident that the distribution of wealth on Steem is subject to heated debate. The Steem blockchain has already been hardforked 19 times to correct its economic mechanism. With the latest hardfork 19, which came in effect June 2017 with the release name "equality", the previously exponential reward curve has been replaced with a linear reward curve, meaning that the vote value of a user is now directly proportional to the size of their stake (SP instead of SP-squared, as before the hardfork). This decision was made in an attempt to smooth out the unequal distribution of wealth, but has not yet had the desired effect, as one participant explains:

"*I think that minnows now have more say, they can vote slightly higher. But it hasn't drastically changed the overall distribution on the platform, so it's still roughly 100 accounts that hold 93% of the STEEM on the Steem blockchain. So, while the blockchain itself is a decentralized application that everybody can use, the distribution of the tokens within that are still heavily slanted. You would have to go back to feudal Europe to find distributions like this between kings and peasants.*" [i1, Core Developer, USA]

During our interviews, we learned that users make very different experiences with Steem's free market model for evaluating social media contributions based on the vested stake of community members. The upside is that it enables opportunities for investment and can provide access to venture capital. Many minnows have received substantial funding from whales for projects that they perceived as a valuable contribution to the Steem community. To name a few examples: Whales have established a process called Steem Growth Project, where whales use their powerful votes to fund projects that promote Steem with up

to 20.000 USD per day; fundition.io is a crowdfunding platform based on the Steem blockchain; and utopian.io is an open source economy based on Steem that received substantial seed funding from whales:

> "*When they understood what the product was about and when they understood my commitment to the project, they really liked to help. They are investors, so they are really trying to grow the value of the Steem Blockchain and its ecosystem in general*" [i6, Platform Innovator, Italy]

The downside of the free market model is that less powerful users are helplessly exposed to the goodwill of more powerful ones. With the current inequality of power distribution, very few of the most powerful users could easily team up to act in their own interest at the expense of most others. But even individual whales can wield their power at the detriment of less powerful users, as one participant reports from her own experience:

> "*I came across one of these guys and he's one of those really weird characters on Steem who have way too much power. Sometimes he just attacks people for no reason. I was on his hit list for a couple of weeks and I nearly left the platform because he had up a flag tail on me. Anything I published got downvoted and that was just painful. You'd sit down, write something and invest your time in it and then you don't get paid for it and it vanishes from the feed because it's hidden from being downvoted so hard by someone with so much power*. "[i13, Content Creator, Israel]

The free market could turn Steem into a system where individual users, through their self-interested collective action, spoil and deplete a common good up to the point where it collapses - a scenario commonly described as the *tragedy of the commons,* as one participant explains:

> "*One possible negative scenario for Steemit is that it ends up in the tragedy of the commons. There's limited supply of Steem and more and more people will fight over this limited supply.*" [i5, Core Developer, Romania]

Paradox P3: Peace and War

From studying social networking practices on Steem, we learned that a BSN can enable peace and war. In this context, peace is understood as enabling altruism and good-mannered behaviors, while war is understood as enabling surveillance, envy, oppression, and political trench wars.

Thesis AT3 (Peace): Steem's public reputation system disincentivizes fraudulent & malicious behavior and incentivizes altruism & good manners.

The criteria by which a contribution to Steem is evaluated are subjectively defined by the community. Steem users collectively reinforce the set of community values and beliefs by using their voting power. Users can use their voting power in two ways to determine who should get paid and how much: Upvotes and downvotes increase and decrease the value of a post as well as the reputation score of the author, respectively. While the value of a post affects only a single payout, the reputation score influences future earnings in the long-term. That means individuals who wish to earn money and attention on Steem must conform with the community's set of values and beliefs, as one participant explains:

> "*I think the Steem blockchain teaches peace, (...) because there's a financial consequence to being horribly racist, sexist, rude, or just purposefully harmful. (...) Not only would it hurt your current rewards, it could hurt your rewards up to seven days past. And if it kills your reputation, it could hurt your future earnings. You are highly incentivized to not be a (douche).*" [i1, Core Developer, USA]

The Steem whitepaper refers to this as leveraging the *crab mentality* of people. Crab mentality is a metaphor that refers to a bucket of living crabs, some of which could easily escape the bucket, but the other crabs will always pull them back to prevent them to escape into freedom and get an advantage over everyone else. The analogy in behavior on Steem is that those, who are perceived as acting maliciously at the expense of others, can get financially punished while those, who are perceived as acting for the good of the community, can get financially rewarded. Many respondents perceive interactions on Steem to be friendlier and more civilized than on other social media platforms.

> *"It's not just about the money, it's also about how the community engages with you. If you go to Facebook or YouTube, you would see so much negativity, so many horrible people just not appreciating what you've done. I don't find this on Steem. People are disagreeing but if they don't like something or they think you can do better, they say (it politely).* [i2, Content Creator, UK]

> "*Most times I do feel like nobody cares about you. But since I joined Steem, I changed my impression about life. There are people out there that actually value you and care about you.*" [i7, Content Creator, Nigeria]

During our interviews, we also learned that many users perceive it to be easier on Steem to be helpful and giving to others. As the Steem whitepaper states, rewarding contributions based on votes instead of direct payments reduces cognitive barriers. Rather than deciding whether or not to pay someone from their own pocket, readers can vote content up or down and the Steem blockchain will use their votes to determine a reward. With the click of a button, users can financially support each other by upvoting or sending tokens, as two participants explain:

> "*Yes, I'm earning. But I'm also distributing rewards. If I have zero dollars in my bank account today, I can go on my Steem account and send someone my SBD that I earned - that I didn't pay for - or I could give him a fat upvote. That's something that makes altruistic behavior much easier. And if it's easier and it doesn't hurt you, you are more likely to do it. People need to be pushed sometimes to be kind and take care of each other and this platform makes it easier. It removes barriers to giving*." [i4, Core Developer, Canada]

In some instances, the removed barriers to giving also span national boundaries in some of the world's most tense conflict zones, as one participant reports:

> "*There's an artist in Iran, and I'm in Israel so this is interesting. I had a contest for a new avatar, because I wanted a new profile picture. She submitted this really beautiful picture, and I (upvoted her post) and last week she got a laptop. I can help someone in Iran buy a laptop, because she drew a really pretty picture of me. And I really wanted her to mail me the framed picture, but she can't (...) because there's no mail between Iran and Israel. So apparently it's easier to send STEEM from Israel to Iran than to send a framed picture.*" [i13, Content Creator, Israel]

Antithesis AT3 (War): Steem's incentivized mutual evaluation and public reputation system can lead to surveillance, envy, oppression, and political trench wars.

Our interviews revealed that many dystopian scenarios are thinkable if and when Steem, in its current form, becomes a mainstream social network. A potential negative scenario for Steem, as a social network that financially incentivizes users to constantly share personal data, which are then subject to ongoing mutual evaluation, is to become a system of universal mutual surveillance and control. The previously described peaceful acts of altruism and good-naturedness would then fall into a hedonic treadmill of reciprocity and hypocrisy, as one participant explains:

> "*One concern is that it makes fake smiles. (...) In a system that rewards people to not be (douches), one of the fears is that it's creating a society of people that are fake-polite to one another.*" [i1, Core Developer, USA]

One may argue that the race for attention and appreciation already takes place on other social media platforms, or that it is even older than social media itself. But on Steem, users are literally more invested and financially dependent on the platform than on other social platforms, which may amplify emotional reactions, such as envy.

> "*It ignites feelings of envy: "Why does this guy make so much money? That's not fair*". [i5, Core Developer, Romania]

Moreover, in the offline world, people usually do not wear their reputation score and bank account statement on their face. Even if they would, others would have to physically and personally interact with them in order to do them harm. But in an online and anonymous social network like Steem, the barrier for harassment is lower and the consequences potentially more devastating, as exemplified here:

> "*(One of my friends on Steem) is a writer. Her posts made quite a lot of money because she got upvoted by (a whale), and then some of the other whales started flagging all her posts because they disagreed with her rewards. She was writing stories for Steem, and this was one of her main jobs.*" [i3, Content Curator, Panama]

> "*That can be really traumatic, especially for someone with very little power. It's like getting hit by a whale who just kills all their profits and kills their exposure, that's just really painful.*" [i13, Content Creator, Israel]

Due to the imbalance of voting power among Steem users, poorer users are particularly susceptible to oppression from more wealthier ones. In some respects, the Steem community resembles an absolutist system under feudal rule, where many small accounts must bow down to very few big ones:

> "*You should have the ability to disagree. But it's a negative personal experience for people to be disagreed with and to find their account nuked by some of these big names. That tends to adversely*

> *affect smaller accounts who don't have enough stake to be able to disagree. So, what happens is that smaller accounts must suck up to a whale. They must keep their mouth shut if they believe something different, because they're scared somebody is going to flag their account into the ground and not only take their rewards, but also their reputation.*" [i4, Core Developer, Canada]

As we also learned from interviews, it is a recurring pattern on Steem for users to form alliances and fight political trench wars over the reward pool. In the Steem community jargon, users informally refer to these as *flagging wars*. Many respondents point to outbreaks of flagging wars, in which some of the wealthies and most reputable users repeatedly become involved in feuds between opposing camps who up- and downvote their posts, respectively. In other instances, powerful whales have been observed to systematically downvote content in order to disincentivize behavior they do not agree with. And then there are the voting alliances that act as self-organizing communities, which use their pooled voting power to protect themselves from oppression by more powerful users. Some of them currently even plan to arm themselves algorithmically, as one user explains:

> "*The idea is to have an algorithm that will look at a flag on a post and it will automatically calculate what that flag took away and attempt to vote it back up, so to neutralize a flag.*" [i4, Core Developer, Canada]

Discussion and Synthesis

In accordance with Schad et al.'s (2016) definition, we identified three paradoxes by juxtaposing two contradictory yet interrelated elements that exist simultaneously and persist over time. In line with Poole and Van de Ven's (1989) proposed coping mechanisms, we synthesize and resolve the paradoxes below.

Table 2 – Dialectic synthesis of Steem paradoxes

Paradox (P)	**Thesis (T)**	**Antithesis (AT)**	**Synthesis (S)**
Paradox P1: Freedom and Captivity	**T1 Freedom**: Steem's *openness* and *irreversibility* enable censorship-resistant freedom of speech and creative expression.	**AT1 Captivity**: Steem's *irreversibility*, incentivized *mutual evaluation*, and *decentralized rewarding system* can hold people captive and lead to self-exploitation, dependence, and addiction.	**S1**: Steem enables everyone to talk, but being heard on Steem requires conformance, endurance, and power.
Paradox P2: Abundance and Scarcity	**T2 Abundance**: Steem's *decentralized rewarding system* can lead to abundance by enabling people around the globe to turn their passion into a profitable profession.	**AT2 Scarcity**: Steem's *incentivized mutual evaluation system* enables a highly skewed distribution of wealth and can lead to a high dependence of most users on few wealthy others.	**S2**: Steem is a large-scale economic experiment with uncertain outcome.
Paradox P3: Peace and War	**T3 Peace**: Steem's *public reputation system* disincentivizes fraudulent & malicious behavior and incentivizes altruism & good manners.	**AT3 War**: Steem's *incentivized mutual evaluation system* can lead to surveillance, envy, oppression, and political trench wars.	**S3**: Through hedonic adaptation, the Steem community will over time converge to a stable state.

Synthesis S1: Steem enables everyone to talk, but being heard on Steem requires conformance, endurance, and power.

The first paradox is the *Freedom and Captivity* enabled by Steem's openness, irreversibility, decentralized rewarding system, and incentivized mutual evaluation. Through these characteristics, Steem enables censorship-resistant freedom of speech and creative expression, but can also potentially lead to self-exploitation, dependence, and addiction. The synthesis of these two contradicting logics is that Steem enables everyone to talk, but being heard on Steem requires conformance, endurance, and power. Our synthesis follows Poole and Van de Ven's (1989) second and third coping strategies, namely spatial and temporal separation of the opposing poles.

A spatial separation of the Freedom and Captivity paradox shows that people tend to experience Steem's freeing and captivating qualities on different levels of analysis, namely the individual level and the

interpersonal level, respectively. On the individual level, users tend to experience more of Steem's freeing qualities, for instance when being enabled to freely express themselves. Everyone can share whatever they want on Steem, and it will be stored permanently and immutably on a public-permissionless blockchain that runs on a decentralized network and resists censorship or control by a central authority. On the interpersonal level, users tend to experience more of Steem's captivating qualities, for instance when being constrained by the race for attention. Being heard and seen on Steem requires conformance with the community values, endurance for building up a reputation, and pooled voting power. Popular content, as measured by post value, gets the most attention on Steem's trending pages, while unpopular content is at risk of being ignored, drowning in the buzz, or even hidden from sight. In our study, we found that users escaped from this captivity by forming alliances with a common pool of voting power. Interestingly, most of this community building took place outside of Steem, on third party communication channels or in offline meetups. Steem could be strengthened by providing better possibilities for community building.

A temporal separation of the Freedom and Captivity paradox shows that people tend to experience Steem's freeing and captivating qualities on different points in time. Steem and its concept are new and represent the emerging class of BSN. Novice users are early adopters and may find Steem liberating compared to other social media platforms. Our study shows that Steem's openness enables users to flexibly adapt their use of Steem to many weakly defined work practices, as well as enable users to customize the Steem platform and its interfaces according to their changing needs. But this freedom is never unrestricted (cf. Leonardi, 2011). As users invest their time, effort, and perhaps even money into Steem, they are likely to become ever more attached to the platform as their stake and network within Steem grows. Previous research on social networking websites has shown that the positive reinforcement websites generate through perceived enjoyment and gratification of use can facilitate the development of a strong pathological and maladaptive psychological dependency on their use, i.e. technology addiction (Turel and Serenko, 2012). Steem is a social networking platform that offers two additional and potentially much stronger gratification triggers than most existing social networking platforms, namely financial rewards and a public reputation score that cannot be easily transferred to another platform. From this, we hypothesize that Steem has a higher addiction potential than social networking platforms, such as Facebook, without these triggers.

Synthesis S2: Steem is a large-scale economic experiment with uncertain outcome.

The second paradox is the *Abundance and Scarcity* enabled by Steem's incentivized mutual evaluation and decentralized rewarding systems. Through these characteristics, Steem enables people around the globe to turn their passion into a profitable profession but can also potentially lead to a skewed distribution of wealth and a high dependence of most users on few wealthy others. The synthesis of these two contradicting logics is that Steem provides an opportunity for defining a sustainable economic model of blockchain ecosystems. Our synthesis follows Poole and Van de Ven's (1989) first and second coping strategies, namely keeping the opposing poles separate and their contrasts appreciated as well as spatial separation.

A spatial separation of the Abundance and Scarcity paradox shows that Steem enables few people to turn their passion into a profitable profession, but most users do not earn sufficient for a living and depend financially on the goodwill of few wealthy others. Economic inequality is neither new nor unique to blockchain economies, such as Steem. Recent studies indicate that about half of the global wealth belongs to roughly 1% of the world's population, and the richest 10% hold nearly 85% of the global wealth (Global Wealth Report, 2013). Empirically, the trend seems to go in the direction of even greater global economic inequality. Blockchain technology may provide an opportunity to counter this development. The World Economic Forum recently projected that up to 10% of the global Gross Domestic Product (GDP) may likely be stored on blockchain technologies by 2025 (World Economic Forum, 2015). Our dialectic examination of Steem provides a forward-looking opportunity for critical reflection on potential economic mechanisms for a sustainable distribution of wealth.

Like the emerging class of BSNs and the entire field of blockchain economics, Steem is novel and its underlying economic model is still in its infancy. Steem is arguably promising but not unrivaled, so it may or may not become a mainstream social network, and its economic model may or may not reach adulthood. For instance, Proof-of-Stake consensus mechanisms, such as the one incorporated in the Steem blockchain, have been criticized for operating a "rentier economy" (Gerard, 2017), leading to an oligopolization of resources and enabling the holders of these resources (the oligarchs) to ripe substantial

benefits without contributing to the economy. This may eventually lead to an inseparable division between rich and poor, hindering economic growth and development of the ecosystem. Indeed, our study indicates that there is an extreme division of power and wealth between richer users (whales) and poorer users (minnows) on Steem, demotivating even some experienced users to remain on the platform. Other users engage in a discourse about wealth distribution on Steem, leading for instance to the move from an exponential to a linear reward curve. Steem is in many aspects a large-scale economic experiment with uncertain outcome.

One potential scenario is that Steem may disrupt the social media landscape and potentially become a dominant player among or above Facebook, Youtube, Reddit, and the like. Instead of centralized social media platforms, we may see BSNs give users back power and control over the way value would be created and distributed online. People around the world may flock to BSNs and start living off their social media earnings. We may see BSNs contribute to greater equality and quality of life, to stronger economic development in emerging markets, to lower poverty levels, to more widespread access to capital and trade, maybe even to a more reconciled world.

Another potential scenario is that other BSNs or existing social media giants may overtake Steem and figure out a better way to use blockchain technology more economically, more user-friendly, more sustainably, or more legally compliant. Flawed economic mechanisms may further increase the divide between rich and poor; Government authorities or law enforcement agencies may tighten the regulatory framework to the detriment of blockchain social networks. BSNs, even cryptocurrencies altogether, may eventually end up as a temporary hype doomed to dying out, and the current profitability of many Steem accounts would then be explicable as simply incidental. Or Steem may simply collapse financially under the pressures of a warring, because unequal, user base.

We cannot predict which way it goes, although we tend to think that something in between these two scenarios is likely, but our data suggests that it stands and falls with a sustainable economic model that provides a healthy middle class. Many respondents were optimistic about Steem moving towards more equality, but a detailed economic analysis is beyond the scope of this study and should be future work. In fact, shortly after we first submitted this paper to ICIS in May 2018, Facebook indeed announced to launch a blockchain initiative (Recode, 2018), which we see as an additional indicator that the social media world as we know it indeed faces large changes due to blockchain. Whether this change will come from within the established social media platforms or through disruptive BSN start-ups is up for us to see, but either way it will be an interesting upcoming decade for social media.

Synthesis S3: Through hedonic adaptation, the Steem community will over time converge to a stable state

The third paradox is the *Peace and War* enabled by Steem's incentivized mutual evaluation and public reputation systems. Through these characteristics, Steem disincentivizes fraudulent and malicious behavior and can enable altruistic and good-mannered behavior, but can also potentially lead to surveillance, envy, oppression, and political trench wars. The synthesis of these two contradicting logics is that the Steem community will eventually converge to a relatively stable state through hedonic adaptation. Our synthesis follows Poole and Van de Ven's (1989) fourth coping strategy, namely finding a new perspective that eliminates the opposition between the opposing poles.

Our data shows that using Steem can lead to a wide range of experiences. Some participants reported that Steem led them to feel appreciated and experienced a generally polite and encouraging conversational tone based on mutual respect, low barriers for charitable actions, and predominantly informed discussions with little to no room for rude and offensive behavior. Others reported that Steem led them to experience prevailing fears from falling behind and losing their precious reputation, to feel oppressed by powerful users, and they were afraid that Steem could create a hypocritical society under total mutual surveillance.

From this, we hypothesize that the Steem community will eventually converge to a relatively stable state through hedonic adaptation. Hedonic adaptation, also known as the hedonic treadmill, is an observed tendency of people to return to a relatively stable level of happiness despite major positive or negative events after some time (Brickman, 1971). Hedonic adaptation has been found to let lottery winners and accident victims tend to return to their same previous levels of happiness, the so-called hedonic set point, some time after the event (Brickman et al., 1978). Given that the original theory of hedonic adaptation implies that an individual's well-being is not significantly affected by otherwise impacting events in the

long term (Lykken and Tellegen, 1996), more recent studies have concerned themselves with the conditions under which events can have a lasting effect on people's hedonic set point (Diener et al., 2006).

Kahneman and Thaler (2006), for instance, predicted that people adapt to conditions that continue to draw their attention, but that the novelty of conditions tends to wear off and draws less attention over time. Our data shows that lasting peace on earth is as unlikely to occur as a result of Steem adaptation as is a lasting global outrage. It is more likely that the novelty of using Steem will wear off after some time and that people will return to their previous well-being levels. Sheldon and Lyubomirksy (2004) demonstrated that continuous acts of kindness can increase the hedonic set point. Our data shows that Steem makes acts of kindness relatively easy by removing barriers for giving, since users do not have to pay out of their own pocket to reward others. It would be interesting for future research to examine empirically how people adjust their hedonic set point to experiences they make on Steem, and whether this hedonic set point is above or below the well-being level prior to Steem adoption.

Theoretical Implications

Blockchain technology is a promising, yet not sufficiently understood, potential enabler of large-scale societal and economic change (Beck 2018). While first studies on technological aspects of blockchain emerge, theory-driven research on social and economic aspects of blockchain technology is only at its outset (Beck et al. 2018). Without theory, the blockchain debate is at risk of being divided into two camps of either overly harsh skepticism or overly enthusiastic optimism. We add a more balanced view to that discourse by theorizing the paradoxical effects of blockchain technology in a social media context. To the best of our knowledge, this paper is the first one in line of a hopefully long series of studies on BSN paradoxes. From our dialectic synthesis of Steem paradoxes, we hypothesize that any technology that offers similar kinds of characteristics could have similar paradoxical effects. We hope that our study inspires and guides further research on the paradoxical effects of BSNs.

Yates and Orlikowski (2007) pointed out that enablement and constraint of digital technologies should be considered as two sides of the same coin. From this perspective, the above-described paradoxes reflect the dual role of blockchain technology in that they emphasize its ambivalences in social networking practices. In fact, our contribution goes a step further by illustrating how BSN can sustain a chain of practices that may ultimately appear as not only ambivalent, but *contradictory*. It follows that a BSN cannot be judged simply against its enabling and constraining effects. Instead, using BSN generates a distinctive tension that requires a critical dialectic synthesis to identify appropriate coping strategies.

The here described effects of financial incentives provided by BSN have important implications for the study of online communities, particularly in the context of open source development and peer-to-peer sharing platforms. Existing studies build on the assumption that people are primarily motivated by non-financial incentives, such as altruism, enjoyment of the work, or self-interest in using the outcome of the work, to make voluntary contributions to a public good (Beck et al., 2015). The here-described novel forms of financial incentivization provided by BSNs may open up new possibilities. We suggest future research to study the effect of BSN's financial incentives on users' motivation to contribute to a public good.

Practical Implications

Our study has practical implications for social media providers in that it illustrates the tradeoffs of using blockchain technology and creates awareness of its provided challenges and opportunities. Leading social networks, such as Facebook and YouTube, are already losing many content creators to Steem (Bloomberg, 2018) and are aware of its potential and threat (Zuckerberg, 2018). Our study shows that Steem, despite its novelty, already plays a major role in the emerging ecosystem of BSNs. Whether it will be emerging startups like Steem or established giants like Facebook that harness the potential of blockchain technology first, the social media sphere will quite certainly witness times of disruptive change in the upcoming years. We suggest researchers and practitioners to seize the ample opportunities for studying and embracing the effects of these next generation social media platforms.

From a privacy viewpoint, our study suggests that there is still unused potential in the application of blockchain technology to protect user's privacy while also enabling them to participate in revenue sharing. In the case of Steem, privacy is very limited as all data is stored on an open ledger, with all the positive and negative effects of a public reputation system and incentivized mutual evaluation, such as good-

mannered behavior, but also a threat of total mutual surveillance. It would be interesting for future research to explore how individuals and organizations adapt to different privacy configurations.

From an economic viewpoint, our study shows that BSNs offer a complementary approach towards decentralized revenue sharing for social media that has the potential to distribute the value of online content more efficiently, more accurately, and less intrusive than centralized revenue sharing models, such as affiliate programs, pay per view models, and content monetization based on advertisement. It would be interesting to see how individuals and organizations adapt to economic mechanisms in different BSNs.

Limitations

This study explores the social networking practices of users who may arguably be experienced early adopters of Steem but are not necessarily representative of the entire Steem community. We use qualitative methods and inductive theory building to identify and describe the phenomenon. Whereas these insights offer possibilities to improve understanding of the effects of blockchain technology on social networking practices, they only offer initial clues about how to *ideally* support these practices on a large scale. Future behavioral studies may examine how different user groups on Steem and similar kinds of BSN platforms perceive the here identified paradoxical effects in order to identify structured guidance and best practices for blockchain social networking. Future design-oriented studies may also design, develop, and evaluate innovative BSN applications in order to counter some of the challenges identified here.

Conclusion

In this paper, we explore how blockchain technology enables and constrains social networking practices. Through an exploratory qualitative study we show that Steem, as a major BSN, offers an array of enabling and constraining characteristics, taken together, can have paradoxical effects on social networking practices that. In line with Schad et al.'s (2016) definition of paradox, we identify three contradictory yet interrelated ambivalences – namely Freedom and Captivity, Abundance and Scarcity, and Peace and War. By means of dialectic synthesis, and in accordance with Poole and Van de Ven's (1989) propositions, we identify appropriate coping strategies and theorize the paradoxical effects of blockchain technology on social networking practices.

Our contribution offers rich insight into the complex interrelationships between blockchain social networking tools and their effects on the underlying practices. Part of our contribution is to condense these insights in a way that makes them transferable to a broader class of BSNs that share basic assumptions with the one we studied. We hypothesize that any blockchain with similar characteristics as Steem can lead to similar paradoxes that need to be embraced and reconciled, rather than regarded in isolation. This study shows how a careful examination of BSNs, such as Steem, can reveal complex, multifaceted, and contradictory tension. The emerging blockchain economy promises much, though many of the details still need to be determined, as our results on the enabling and constraining effects of BSN illustrated.

We also see great potential in studying the ethics underpinning BSN. For instance, the lack of age restriction and content filters may put vulnerable people at risk. It is also questionable whether the Steem community does, in practice, reflect the values they subscribe to in the white paper (Larimer et al., 2018). Is it really about community building and fairer distribution of value (whatever "fair" means in this context), or does Steem actually (re-)create the already existing divisive capitalist economy where whales take advantage of minnows, hence throwing into question whether such a platform is necessary at all? And what can we learn about the governance of blockchain ecosystems from studying BSN? How could BSN governance reflect societal ethics while also protecting freedom of speech? How should the economic mechanisms underlying BSN be designed to provide sustainable growth while also decentralizing wealth? And how can a BSN enable polite discourse while also allowing to express critical views? We do not claim to have all answers, and this study can only provide in part preliminary answers, but we hope that our study inspires the readers to critically reflect on what we have seen on Steem to figure out an answer for themselves.

References

Beck, R., 2018. Beyond Bitcoin: The Rise of Blockchain World. IEEE Computer 51, 54–58.

Beck, R., Rai, A., Fischbach, K., Keil, M., 2015. Untangling knowledge creation and knowledge integration in enterprise wikis. Journal of Business Economics. 85, 4, p. 389-420

Beck, R., Müller-Bloch, C., King, J.L., 2018. Governance in the Blockchain Economy: A Framework and Research Agenda. Forthcoming in: Journal of the Association for Information Systems.

Benthaus, J., Risius, M., Beck, R., 2016. Social media management strategies for organizational impression management and their effect on public perception. The Journal of Strategic Information Systems 25, 127–139.

Bloomberg, 2018. YouTube and Facebook Are Losing Creators to Blockchain-Powered Rivals. https://www.bloomberg.com/news/articles/2018-04-10/youtube-and-facebook-are-losing-creators-to-blockchain-powered-rivals.

Brickman, P., 1971. Hedonic relativism and planning the good society. Adaptation-level theory. Academic Press

Brickman, P., Coates, D., Janoff-Bulman, R., 1978. Lottery winners and accident victims: Is happiness relative? Journal of personality and social psychology 36, 917.

Ciriello, R.F., Richter, A., Schwabe, G., 2018. The Paradoxical Effects of Digital Artifacts on Innovation Practices. European Journal of Information Systems.

CNBC, 2018. Apple co-founder Steve Wozniak says he's left Facebook over data collection [WWW Document]. URL https://www.usatoday.com/story/tech/2018/04/08/apple-co-founder-steve-wozniak-says-hes-leaving-facebook/497392002/ (accessed 5.1.18).

CoinMarketCap, 2018. Steem (STEEM) price, charts, market cap, and other metrics | CoinMarketCap [WWW Document]. URL https://coinmarketcap.com/currencies/steem/ (accessed 5.1.18).

DeCuir-Gunby, J.T., Marshall, P.L., McCulloch, A.W., 2011. Developing and using a codebook for the analysis of interview data: An example from a professional development research project. Field Methods 23, 136–155.

Diener, E., Lucas, R.E., Scollon, C.N., 2006. Beyond the hedonic treadmill: revising the adaptation theory of well-being. American psychologist 61, 305.

Eisenhardt, K.M., 2000. Paradox, spirals, ambivalence: The new language of change and pluralism. Academy of Management Review 25, 703–705.

Forbes, 2018. Opportunities For Blockchain Based Social Apps [WWW Document]. Forbes. URL https://www.forbes.com/sites/ksamani/2018/04/09/opportunities-for-blockchain-based-social-apps/ (accessed 5.1.18).

Forbes, 2017a. Facebook Users Posted A Third Less Content In 2016 Than In 2015 [WWW Document]. URL https://www.forbes.com/sites/paularmstrongtech/2017/02/14/facebook-users-posted-a-third-less-content-in-2016-than-in-2015/#4b37f428776d (accessed 5.1.18).

Forbes, 2017b. Will Blockchain Reinvent Social Media? [WWW Document]. Forbes. URL https://www.forbes.com/sites/steveolenski/2017/08/09/will-blockchain-reinvent-social-media/ (accessed 5.1.18).

Gerard, D., 2017. Attack of the 50 foot blockchain: Bitcoin, blockchain, Ethereum & smart contracts. David Gerard.

Global Wealth Report, C.S., 2013. Global wealth report 2013. Zurich: Crédit Suisse. https://publications.credit-suisse.com/tasks/render/file/?fileID=BCDB1364-A105-0560-1332EC9100FF5C83.

Gregory, R.W., Keil, M., Muntermann, J., Mähring, M., 2015. Paradoxes and the Nature of Ambidexterity in IT Transformation Programs. Information Systems Research 26, 57–80.

Hargrave, T.J., Van de Ven, A.H., 2017. Integrating dialectical and paradox perspectives on managing contradictions in organizations. Organization Studies 38, 319–339.

Jarvenpaa, S.L., Lang, K.R., 2005. Managing the paradoxes of mobile technology. Information systems management 22, 7–23.

Kahneman, D., Thaler, R.H., 2006. Anomalies: Utility maximization and experienced utility. Journal of Economic Perspectives 20, 221–234.

Klein, H.K., Myers, M.D., 1999. A set of principles for conducting and evaluating interpretive field studies in information systems. MIS quarterly 67–93.

Larimer, D., Scott, N., Zavgorodnev, V., Johnson, B., Calfee, J., Vandeberg, M., 2017. Steem: An incentivized, blockchain-based social media platform. https://www.steem.io/steem-whitepaper.pdf.

Leonardi, P.M., 2011. When flexible routines meet flexible technologies: Affordance, constraint, and the imbrication of human and material agencies. MIS quarterly 35, 147–167.
Lewis, M.W., 2000. Exploring paradox: Toward a more comprehensive guide. Academy of Management Review 25, 760–776.
Lykken, D., Tellegen, A., 1996. Happiness is a stochastic phenomenon. Psychological science 7, 186–189.
Nakamoto, S. (2008). Bitcoin: A peer-to-peer electronic cash system.
Nærland, K., Müller-Bloch, C., Beck, R., Palmund, S., 2017. Blockchain to Rule the Waves – Nascent Design Principles for Reducing Risk and Uncertainty in Decentralized Environments, in: International Conference on Information Systems (ICIS2017), Seoul, South Korea.
Peters, G.W., Panayi, E., 2016. Understanding modern banking ledgers through blockchain technologies, in: Banking Beyond Banks and Money. Springer, pp. 239–278.
Poole, M.S., Van de Ven, A.H., 1989. Using paradox to build management and organization theories. Academy of management review 14, 562–578.
Robey, D., Boudreau, M.-C., 1999. Accounting for the contradictory organizational consequences of information technology: Theoretical directions and methodological implications. Information systems research 10, 167–185.
Samelson, Q., 2017. Why use Blockchain instead of another technology? [WWW Document]. IBM Electronics Industry Blog. URL https://www.ibm.com/blogs/insights-on-business/electronics/use-blockchain-instead-another-technology/ (accessed 8.14.18).
Sarker, S., Sahay, S., 2004. Implications of space and time for distributed work: an interpretive study of US–Norwegian systems development teams. European Journal of Information Systems 13, 3–20.
Schad, J., Lewis, M.W., Raisch, S., Smith, W.K., 2016. Paradox research in management science: Looking back to move forward. The Academy of Management Annals 10, 5–64.
Schultze, U., Avital, M., 2011. Designing interviews to generate rich data for information systems research. Information and Organization 21, 1–16.
Sheldon, K.M., Lyubomirsky, S., 2004. Achieving sustainable new happiness: Prospects, practices, and prescriptions. Positive psychology in practice 127–145.
Silverman, D., 2006. Interpreting qualitative data: Methods for analyzing talk, text and interaction. Sage.
Smith, W.K., Lewis, M.W., 2011. Toward a theory of paradox: A dynamic equilibrium model of organizing. Academy of Management Review 36, 381–403.
Smith, W., Erez, M., Jarvenpaa, S., Lewis, M.W., Tracey, P., 2017. Adding Complexity to Theories of Paradox, Tensions, and Dualities of Innovation and Change: Introduction to Organization Studies Special Issue on Paradox, Tensions, and Dualities of Innovation and Change. Organization Studies 38, 303–317. https://doi.org/10.1177/0170840617693560
SMT Whitepaper, 2018. Smart Media Tokens (SMT). https://smt.steem.io/smt-whitepaper.pdf
Statista, 2018. Facebook - revenue and net income 2017 [WWW Document]. Statista. URL https://www.statista.com/statistics/277229/facebooks-annual-revenue-and-net-income/ (accessed 5.1.18).
Steem Bluepaper, 2017. Steem Bluepaper. https://steem.io/steem-bluepaper.pdf
The Guardian, 2018. Far more than 87m Facebook users had data compromised, MPs told. The Guardian.
Turel, O., Serenko, A., 2012. The benefits and dangers of enjoyment with social networking websites. European Journal of Information Systems 21, 512–528.
Van de Ven, A.H., 2007. Engaged scholarship: a guide for organizational and social research: a guide for organizational and social research. Oxford University Press.
Walsham, G., 2006. Doing interpretive research. European journal of information systems 15, 320–330.
Walsham, G., 1995. Interpretive case studies in IS research: nature and method. European Journal of information systems 4, 74–81.
Weston, C., Gandell, T., Beauchamp, J., McAlpine, L., Wiseman, C., Beauchamp, C., 2001. Analyzing interview data: The development and evolution of a coding system. Qualitative Sociology 24, 381–400.
World Economic Forum, 2015. Deep shift, technology tipping points and societal impact, in: New York: World Economic Forum–Global Agenda Council on the Future of Software & Society (REF 310815). Http://www3.weforum.org/Docs/WEF_GAC15_Technological_Tipping_Points_report_2015.pdf.
Yates, J., Orlikowski, W., 2007. The PowerPoint presentation and its corollaries: how genres shape communicative action in organizations. Communicative practices in workplaces and the professions 67–91.
Zuckerberg, M., 2018. New Year's Blogpost [WWW Document]. URL https://www.facebook.com/zuck/posts/10104380170714571 (accessed 5.1.18).