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W. Currie, J. Seddon

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**Insights into Bitcoin and Decentralized Finance: Unpacking the Narratives of
'Techno-Enthusiasts' and 'Techno-Critics'**

Wendy L. Currie

Professor of Information Systems and Management
Audencia Business School
8 route de la Joneliere, BP 31222 Cedex 3, Nantes 44312, France
Email: wcurrie@audencia.com
Tel: +44 (0) 75 25 64 72 49

Jonathan J.M. Seddon

Associate Professor, Information Systems and Management
Audencia Business School
8 route de la Joneliere, BP 31222 Cedex 3, Nantes 44312, France
Email: jseddon@audencia.com

ABSTRACT

This paper explores the narratives of the evolution of the first digital asset, Bitcoin. Emerging as an unregulated, decentralized digital asset, it was developed as an alternative to fiat currency. Using primary and secondary data sources, the discussion is framed around four key themes that influence adoption: cryptographic technology, trust, decentralized finance, and regulation. Each focal theme extends the dialectical debates on Bitcoin, revealing competing narratives on digital responsibility and oversight of the nascent digital asset market. A nuanced understanding of the trajectory and scope of digital currencies to repurpose financial markets is presented.

This study aligns with this special issue through its analysis of positive and negative crypto contributions and the digital responsibilities that develop from transformation and adoption. A major contribution is that decentralized finance is not empirically confirmed, as centralized financial institutions are now offering digital assets as part of their regulated client portfolios.

Keywords: Crypto Technology, Trust, Regulation, Decentralized Finance, Bitcoin, Ethereum.

Insights into Bitcoin and Decentralized Finance: Unpacking the Narratives of ‘Techno-Enthusiasts’ and ‘Techno-Critics’

1. INTRODUCTION

An alternative to traditional government-supervised central banking systems is nothing new. Such fiat currency “...has the defects of all monopolies: one must use their product even if it is unsatisfactory, and, above all, it prevents the discovery of better methods of satisfying a need for which a monopolist has no incentive” (von Hayek, 1976, p. 28). Each government influences the nation’s fractional-reserve banking systems through various regulatory and supervisory mechanisms, providing levers of control over inflation and borrowing.

The Bitcoin organization’s website states, “*Bitcoin uses peer-to-peer technology to operate with no central authority or banks; managing transactions and the issuing of bitcoins is carried out collectively by the network. Bitcoin is open-source; its design is public; nobody owns or controls Bitcoin and everyone can take part*” (<https://bitcoin.org/en/>). Bitcoin (BTC) was an alternative to fiat currency, allowing customers to exchange funds using P2P tools (Manimuthu et al., 2019). Even before the arrival of its first transaction on 12 January 2009 (Blockchain.com, n.d.), the dynamic complexity of the evolving financial system was “*greater than what is knowable*” (Hoffmann, 2017, p. 736). One problem with any digital asset is that information can be falsified or duplicated (known as double-spending). BTC solved this by using the proof-of-work (PoW) algorithm developed for Hashcash (Black, 2002), blockchain technology (Haber and Stornetta, 1991), and decentralization (Lacity, 2022). With the global growth of the internet, a new financial paradigm was proposed. Cryptographic algorithms would be used to replace centralized, regulated, and trusted third parties. Whilst some argued BTC would make financial markets more efficient, and available to all (including the unbanked) (Caporale & Plastun, 2019), others questioned this view (Pagnotta, 2022).

Over the next decade, other distributed ledger technologies developed, offering alternative block-writing and validation methods (Conley, 2017). These cryptographic tokens were either native to a blockchain (e.g., the altcoin Ethereum, ETH) or built on top of it, and used to manage decentralized finance (DeFi) applications such as smart contracts, decentralized autonomous organizations (DAOs), and non-fungible tokens (NFTs) (Constantinides et al., 2018; Schwiderowski et al., 2024; Hartwich et al., 2024; Saurabh, 2024). Supporters argue that substituting centralized finance (CeFi) with DeFi offers consumers an alternative investment and payment system, albeit without the regulatory controls and oversight of traditional banking institutions. Claimed advantages include increased competition and efficiency within financial services, lower transaction costs, quicker execution times, enhanced trade financing, improved cross-border payments, and diminished dependence on trusted third-parties (De Rossi et al., 2022; IMF, 2023). Supporters argued that it created an open and free society, spreading the values of cyberpunk culture (Schmittgen & Bucher, 2024). Digital privacy through anonymity supported a trustless society.

This paper examines four key areas in Nakamoto's digital assets vision: (1) the replacement of trust in a third-party with trust in code, (2) technology necessary to automate PoW transactions, (3) a robust decentralized system, and (4) a protocol that removes traditional regulation. What are the unintended consequences of a system that sought to replace fiat currency and the banks that supported government policies? To help guide this inductive study, two research questions were asked:

RQ1. How have competing narratives around trust, decentralization, and regulation shaped the institutionalization of BTC as an alternative to fiat currency?

RQ2. *How do regulatory responses to BTC reflect tensions between its decentralized origins and its integration into traditional finance?*

These research questions are examined through four thematic lenses: trust, cryptographic technology, decentralized finance, and regulation. RQ1 primarily engages with trust, decentralization, and regulation to explore how competing narratives shape the institutionalization of BTC. RQ2 focuses on how regulatory responses interact with these same themes, particularly as BTC becomes integrated into traditional financial systems. By contrasting the narratives of techno-enthusiasts and techno-critics, the study captures the underlying ideological divide that informs institutionalization. This analysis highlights how BTCs conceptual foundations, decentralization, and trust in code, conflict with its practical integration into regulated markets. This tension is central to answering both RQ1 and RQ2, offering a nuanced understanding of BTCs evolving role in financial systems. Our findings yield three theoretical contributions to IS research on decentralized technologies:

1. Building on Beck et al.'s (2018) analysis of governance tensions in decentralized systems, we identify a *Paradox of Institutionalized Decentralization*, where BTCs ideological commitment to trustlessness clashes with its trading by regulated financial intermediaries. This decentralization paradox demonstrates that technological design alone cannot override institutional and market pressures.
2. While Gervais (2010) analyzes regulatory adaptation broadly, we identify *Protocol Drift* as a distinct process in decentralized systems, where on-chain protocols persist but off-chain applications absorb traditional financial logics. This challenges deterministic views in IS that equate cryptographic trust with institutional disruption.

3. By analyzing techno-enthusiast and techno-critic narratives, *Hybrid Governance* emerges from the tension as BTCs on-chain autonomy (Nakamoto, 2008) and off-chain regulation (SEC, 2024) compete for dominance. While Vergne (2020) frames this as a shift from “decentralized” to “distributed” systems, we argue it reflects a contentious coexistence, where neither code nor law fully dominates (Rossi et al., 2019). This reframes “coexistence” as an unstable negotiation rather than harmonious integration.

The paper is structured as follows. Building on the extant literature, a conceptual framework is developed that illustrates the relationship between these four themes. Following this, our data and analysis are presented. The discussion section extends statements made in Nakamoto’s seminal paper with observations from today’s financial market.

2. LITERATURE REVIEW

The Great Recession (2007- 2009) was the most significant banking failure since the 1929 Wall Street stock market crash and the ensuing Great Depression (1929 – 1933) (Shanaev et al., 2020; Raza et al., 2023). The report published by the United States Financial Crisis Inquiry Commission (2011) revealed that banks and investment firms prioritized profit-making above customer interests. Low confidence in existing sovereign finance offered the opportunity for an alternative – BTC (Zohar, 2015). Nakamoto’s white paper “*Bitcoin: A Peer-to-Peer Electronic Cash System*” was made available to the public on October 31, 2008. This seminal work laid the foundations not only for BTC but for every other crypto-asset. Its conclusion read, “*We have proposed a system for electronic transactions without relying on trust [2.1] ...we proposed a peer-to-peer network using proof-of-work [2.2] ...impractical for an attacker to change if honest nodes control a majority of CPU power [2.3] ...accepting the proof-of-work chain as proof of what happened [2.4]*” (Nakamoto, 2007, p. 8). This defined our four research areas, each

numbered in the text. Whilst other topics can be investigated, such as the analysis of the blockchain (Ehrenberg & King, 2020), reviewing how blockchain code is developed (Renwick & Gleasure, 2021), issues of scalability (Khacef et al., 2023), or BTC data security (Vičić & Tošić, 2022), the four themes discussed in this paper represent the core principles behind BTC. Each will now be discussed in turn.

2.1 Trust

The lack of trust, which inhibited online contacts (Shankar et al., 2002), was presented as resolved by decentralized networked computers (or nodes), validating each transaction against a shared copy of every recorded transaction. Blockchain promotes and influences trust by design (Hina et al., 2024) as consumers can efficiently trace and access trustworthy information. Trust in any third party to manage and process financial activities was no longer necessary (Rossi et al., 2019). Traditional fund transfers are completed with minimal processing actions, reducing steep institutional fees charged by banks and financial institutions for every wire transfer. Powerful narratives on trustless technology, the democratized financial system, and resistance towards government bodies looking to regulate crypto-assets supported this movement (Currie & Seddon, 2024). Trust in the crypto ecosystem extends beyond individual trust in an institution or individual to trust in technology or code (Beck et al., 2018). Software writers play the role of escrow, but no guarantee developed code has not been corrupted (Li & Whinston, 2020).

Scholarship on trust covers diverse themes and topics. The hype over crypto-assets can be described as an ideology about social change where influencers play a vital role in shifting crypto-asset markets and valuations, both positively and negatively. Trust is the main non-economic condition of money (Simmel, 1990). By investing in unregulated crypto-assets, unsophisticated investors place their trust in an inchoate or unproven technology. Code controls

the blockchain, validated by consensus mechanisms. Thus, the narrative of trust in technology is reaffirmed over trust in government or financial institutions (Lacity et al., 2024). However, public concern about trust and the ethics underpinning the BTC protocol (Zamani, 2022) influence regulatory and institutional narratives that rest on coercive and normative pressures to maintain social norms (Hudson, 2015).

BTC is one of the few crypto-assets that used mining rather than an initial coin offering (ICO) to finance development and issue (Adhami et al., 2018; Brochado & Troilo, 2021). The ICO for ETH took place during 2014 when trust in its whitepaper's transparency and project goals reassured investors about the project's legitimacy and prospects. Since then, thousands of ICOs with high price and volume fluctuations have been seen as an opportunity for arbitrage (Gandal et al., 2021).

A significant difference between a crypto-asset and fiat currency is that the government will guarantee deposits at banks (e.g., in the US, the Federal Deposit Insurance Corporation guarantees deposits up to \$250,000 per depositor, per insured bank). Human error on the part of the financial institution is less risky for customers. No guarantee exists for unregulated crypto-assets.

2.2 Crypto Technology

BTC developed a blockchain network using the internet to democratize payments (Nakamoto, 2008). When any transaction occurs, SHA-256 is used to create a unique identifier called a transaction hash. This technique was developed by the US National Security Agency, first published in 2001. Decentralized nodes compete to solve a complex mathematical puzzle in a process called mining. The winner, having incurred financial costs in solving this puzzle (e.g.,

technology and electricity), is rewarded with BTC. Transactions are grouped into blocks, which contain a list of recent transactions, a timestamp, and a reference to the previous block. Once the BTC blockchain is updated, a copy is sent out to every node in the decentralized network for verification, effectively creating one massive supercomputer. This process is called the PoW consensus. Due to the number of nodes, should one or more fail, for whatever reason, the end outcome remains a high-reliability structure. Ultimately, with sufficient nodes, this consensus operates as an error-free system (Salovaara et al., 2019).

A blockchain was first developed to prevent any tampering of digital documents (Haber & Stornetta, 1991). Its use of the Elliptic Curve Digital Signature Algorithm (elliptic curve cryptography) was accepted in 1998 as an ISO standard (Johnson et al., 2001). Virtual economies, which created and employed their own currencies, were introduced by video games such as RuneScape and World of Warcraft in the early 2000s (Paajala et al. 2022). Liberty Reserve, founded in 2006, popularized the idea of anonymously processing payments outside of the legacy financial system for the broader market of a universal currency (Dierksmeie & Seele, 2018), taking the idea of videogame's virtual currencies to a global scale.

Research in information systems highlights various use cases of blockchain technology for the exchange of digital assets (Lacity, 2022; Ilk et al., 2021; Chong et al., 2019). However, there is less focus on exploring the complexities of firm interconnectivity (scaling), the novelty of this technology, and the mechanisms through which value is generated. While BTC's primary focus was to offer a digital fiat alternative, the ETH blockchain platform enabled the creation of many other innovations (Buterin, 2014).

All digital transformation is an uncertain process (Carroll et al., 2023; Vial, 2019). Digital technology in the financial sector extends beyond process and product innovation towards transforming how institutions and investors engage with government agencies, regulators, and policymakers across jurisdictions. Crypto-assets are IT artefacts (Benbasat & Zmud, 2003) that emanate from a socially constructed technological world (Berger & Luckman, 1966; Schutz, 1967). Theorization of emerging cryptocurrencies, like other digital technologies, occurs in parallel to myths and falsehoods about the empirical consequences of disruptive innovation (Christensen, 1997; Paech, 2017). Research has indicated that when adopting blockchain technology, stakeholders should focus on “*psychological factors rather than technological factors*” (Yeoh et al., 2024, p. 1121).

2.3 Decentralized Finance

A core principle of BTCs blockchain is its decentralized ledger, recording all transactions across a network of nodes. Due to the time and processing costs required to change earlier blocks, it is regarded as immutable (Simser, 2015). The more confirmation of new transactions (i.e., the more blocks have been added), the less likely an earlier transaction can be reversed because of the cost of rewriting the blockchain (Karame et al., 2012). This enhances security, reduces the risk of censorship, and promotes transparency. Ensuring no single entity has control over the network allows “*the broad dispersion of the ability to exchange data and information within communication systems*” (Vergne, 2020, p. 4). Mining pools are geolocated in areas of cheap electricity, controlling the means of validating transactions and mining new coins (Shi, 2016). Global adoption of the internet, supported by innovation in cryptography, all maintained the development of a decentralized currency (Zetsche et al., 2020). Techno-libertarians presented this new paradigm as an alternative to the control every government imposes on individual

finances. Unlike earlier digital currencies that were shut down (e.g., E-gold (US DoJ, 2007)) or restricted (e.g., BTC in China (Xie, 2019)), no single government can close BTC down.

BTC can be stored by individuals in a crypto wallet, allowing them to either hide coins that they own (by turning the computer or phone off) or as a pseudonymous transaction with another wallet. Being decentralized and permissionless, these events are antithetical to the existing centralized monetary structure. Decentralized applications and peer-to-peer (P2P) operations mimic and enhance financial activities through DeFi (Milne & Parboteeah, 2016; Eikmanns et al., 2023). DeFi challenges traditional methods of control, which rely on the regulation of entities, middlemen, and gatekeepers (Nabilou, 2019). PoW is used by BTC to support open-sourced code and protocols. Buterin, the co-founder of ETH, credited the success of BTC as the first truly decentralized solution to the PoW problem. Validation of its blockchain no longer requires known counterparties.

However, innovative technologies have also engendered new types of criminal schemes (Klein et al., 2024), something that was not considered when defining BTC as an alternative to fiat. The emerging literature on the dark side of crypto-assets and its influence on criminal behavior includes studies on money laundering (Albrecht et al., 2019; Guidara, 2022), market manipulation (Eigelshoven et al., 2021), wash trading at unregulated exchanges (Cong et al., 2022), and their selection as the primary choice of payment demanded by hackers and fraudsters (Lee, 2019; Li, X., & Whinston, 2022). Unique to crypto is when developers program their blockchain so that only they can sell, dumping their tokens when the price is high (Legge, 2024).

2.4 Regulation

Nakamoto's white paper does not mention regulation because algorithmic code, which executes as programmed, is positioned as technologically neutral, thus reducing the need for regulatory oversight (Gervais, 2010). The holders of digital assets are expected to comply with existing regulatory rules and laws. In the US, complexity on how to regulate a crypto-asset exists between the Securities and Exchange Commission (SEC) and the Commodity Futures and Trading Commission (CFTC). BTC was not originally considered for regulation because of its low market capitalization and niche adoption. But as it became more popular, regulators were slow to adopt any controls because their experience and focus were on traditional financial systems. The SEC chair, Gary Gensler, for many years thought that only BTC was a commodity, and its regulation fell under CFTC rules. All other crypto-assets issued using alleged distributed ledger technology meet the conditions of a security. BTCs inherent design of anonymity and decentralization, coupled with a protocol that removed traditional audit, made it difficult for regulators to track and control. Whilst the SEC still regarded BTC as the only decentralized crypto-asset, in 2017 the CFTC declared that "*Bitcoin and other virtual currencies are properly defined as commodities*" (CFTC, 2017). The following year, the SEC declared that ETH should also be classified as a commodity because it was now sufficiently decentralized (SEC, 2018). This debate over which regulatory body controlled these assets continued over the next few years.

In June 2023, the SEC sued Binance, the largest crypto exchange in the world. Their chief compliance officer admitted that "*We do not want [Binance.com] to be regulated ever*" (Reuters, 2023). One report highlights the pro-innovation lobby's stance, revealing that the crypto-asset exchange platform Coinbase, along with twenty-six lobbyists, raised approximately \$1.5 billion to advocate for the benefits of crypto-assets to US policymakers and legislators. The confusion is

demonstrated by the final judgment of the case between the SEC v. Ripple Labs over its sale of XRP tokens. On August 7, 2024, this ruling stated that XRP was not a security when sold to retail investors, but it was a security when sold to institutional investors.

Crypto-assets create challenges for regulators engaged in policymaking (Nabilou, 2019). They “...may contribute to monetary and financial instability, especially if they were to spawn a large and unregulated financial system that lacks investor protection” (Prasad, 2021, p. 20). Concerns over the lack of crypto-assets and blockchain regulation were shown when an open letter was given to US lawmakers, signed by leading computer scientists and academics (Chipolina, 2022). Crime varies from “mild and victimless” to profoundly serious crimes of “human trafficking, drug running, slavery, and terrorism” (Chohan, 2022, p. 15). In 2024, the US House of Representatives passed the Financial Innovation and Technology for the 21st Century Act (US GOV, 2024), aimed at establishing a comprehensive regulatory framework for digital assets.

3. RESEARCH METHODS

A qualitative research approach based on inductive theory-building was employed to gather data from participants involved in the crypto-asset market (Gioia et al., 2012). Such research offers the potential for originality in theorizing by developing a less specific, more general approach to identifying concepts that describe or explain a particular phenomenon. This approach is necessary to produce insightful research studies (Corley & Gioia, 2011) that can be used to make sense of a socially constructed environment (Berger & Luckman, 1966; Schutz, 1967). Gioia’s framework is designed to bring rigor to qualitative research, ensuring that the findings are credible and trustworthy. It is noteworthy that theory-driven studies usually begin after technology has gained some traction in the market (Rotolo et al., 2015).

A semi-structured interview protocol was followed. This helps prevent the imposition of preconceived biases when interpreting the views and opinions of informants. Interview data is organized and categorized systematically, crucial for thorough analysis. This design treats informants as knowledgeable agents who define their own realities. Inductive research of this kind significantly impacts the methods and reasons for data collection, as it emphasizes informants' interpretations of the phenomena being studied. The researcher's role is to deliver a thorough and persuasive account of the informants' experiences (Gioia et al., 2012).

Research employed a grounded theory approach to collect and analyze the primary interview data from informants (Strauss & Corbin, 1990; Charmaz, 2006). This inductive process begins with a series of empirical observations, allowing patterns to be identified, enabling theory to be built from empirical data (Eisenhardt, 1989). Grounded theories emerging in this way are more robust and relevant. The focus is on convincing narrative accounts provided by various stakeholders. The methodology enables researchers to engage in an iterative process of data collection and analysis. This constant comparative method ensures that emerging theory is grounded in the data, as new and old information are compared continuously. Findings are presented in a coherent and persuasive narrative, enhancing the clarity and impact of the research. Multiple follow-up contacts with informants allow a nuanced understanding and interpretation of the dynamic and volatile crypto-asset market.

3.1 Data Collection

From an all-time high achieved on 10 November 2021 until 21 November 2022, BTC's market capitalization fell by approximately 75%, and its price dropped by about 76%. This period is known as the crypto winter. It was not until 6 March 2024 that its price would pass the earlier

peak¹. During this period, the global crypto-asset market faced financial uncertainty and elevated risk. Fieldwork took place during this turbulent time, with visits to Chicago, US, made in January and February 2023.

The Global Digital Asset and Cryptocurrency Association (Global DCA) is an international self-regulatory association for the digital asset and cryptocurrency industry. Membership of this organization assisted in identifying crypto-asset companies and relevant industry participants for inclusion in the study. In total, thirteen informants were interviewed, who were either key industry stakeholders, software engineers, or regulators. All were at different companies. Interviews lasted between 45 and 90 minutes, both in person and via online platforms like Teams or Zoom. Each interview recording was transcribed using an artificial intelligence tool, ‘rev ai’ (<https://www.rev.ai/>). If any interviewee comments were unclear, the researchers directly contacted the informants to obtain additional clarification. Finally, all interviewees reviewed summaries of their quotes for accuracy (Lincoln & Guba, 1985).

Interview data was collected on stakeholder direction, value creation strategies, and regulatory tensions from existing rules and laws. The authors led the interviews and attended multiple Global DCA meetings and events. Secondary source data and materials, collected over a full year, were thoroughly read and reviewed by the authors. Table 1 outlines the primary and secondary data sources used in this research project, together with the coding methods used.

Table 1: Current Primary and Secondary Data Sources Used for Coding

Primary Data Source		
Transcripts: Open coding → Axial coding → Selective coding (Strauss & Corbin, 1990).		
<i>Informants (Code) [#]</i>	<i>Focus</i>	<i>Details</i>

¹ <https://calendar.bitbo.io/price/2022/> and [.../2023/](https://calendar.bitbo.io/price/2023/)

Crypto Firm (cpt#) [5]	Institutional	FinTech firm’s employees engaged in crypto trading, software development and marketing.
Investor (inv#) [5]	Investor	Institutional and retail investors. Responsible for investment strategies and portfolio holdings.
Regulator (reg#) [3]	Societal	Compliance officers, all involved with developing regulatory oversight and best practice policies.
Secondary Data Source		
Documents: Thematic analysis for policy keywords (Braun & Clarke, 2006). News Articles: Sentiment analysis (positive/negative framing of BTC).		
US regulatory publications		Main bodies are the SEC, the CTFC, the Federal Trade Commission (FTC), the Internal Revenue Service (IRS), and the Financial Crimes Enforcement Network (FinCEN).
Academic journals, conferences, and working papers.		Attendance at ICIS, AMCIS, and ECIS conferences, and workshops within both the US (Chicago) and the UK (London).
Consultancy Reports		These include “Gartner - Top Strategic Technology Trends for 2021” ² , “McKinsey - Technology Trends Outlook 2022” ³ and “PwC - Global Crypto Regulation Report 2023” ⁴ .
Crypto industry body Global DCA		Established to guide the evolution of digital assets, cryptocurrencies, and the underlying blockchain technology. Assisted in identifying crypto-asset companies and related market participants within the industry.
Conferences		Attendance at forums such as the London Blockchain Conference (2023), which focused on electronic cash systems to power transaction-based data economies.

The primary data falls into three distinct groups:

- 1 Five individuals engaged in trading crypto-assets. All were male, under thirty, and had strong technical backgrounds. They were all engaged in the crypto-asset market, developing assets or products that they hoped would become decentralized.

² <https://www.gartner.com/smarterwithgartner/gartner-top-strategic-technology-trends-for-2021>

³ <https://www.mckinsey.com/~/media/mckinsey/business%20functions/mckinsey%20digital/our%20insights/the%20top%20trends%20in%20tech%202022/mckinsey-tech-trends-outlook-2022-full-report.pdf>

⁴ <https://www.pwchk.com/en/research-and-insights/2022-global-cryptocurrency-ma-fundraising-report-feb2022.pdf>

- 2 Five employees engaged in financial investment strategies. Three male and two female, aged between 30 and 50, all qualified fund managers. All had a mandate to investigate and where appropriate include assets such as BTC in their portfolios.
- 3 Three senior compliance officers with an understanding of the regulatory approaches of the SEC and CFTC. All were male, aged between 40 and 50, and involved with state discussion on crypto-assets.

All crypto firms were committed to creating new businesses from blockchain architectures. Investment firms were driven by public enthusiasm to create new investment opportunities. Regulators investigated how existing rules could be applied to a new asset type, rather than creating specific rules for each new product. None of the interviewees questioned whether or how BTC was traded but instead argued why they either supported or criticized its use.

3.2. Data Analysis

Grounded theory does not begin from a completely *blank slate* perspective (Charmaz, 2014), instead stakeholder concepts serve as the foundation for research design. Primary and secondary source data were collected and analyzed simultaneously to describe and explain social phenomena (Corbin & Strauss, 1990). All observed phenomena are not static but transform with market structure and regulatory change. This means an essential part of the research design was to incorporate change into the method through process analysis (Langley, 1999). A blend of detailed descriptions of crypto firms' market strategies, narrative accounts from informants, and factual data from market reports enabled the authors to develop insights into how and why new crypto-assets were developed, together with risks faced by consumers. Open coding was used to analyze the data and develop first order concepts (Gioia et al., 2012). Events, actions, and interactions among informants were analyzed for similarities and differences (Corbin & Strauss, 1990).

Analysis was refined to uncover insights about the events reflected in the data. To avoid any bias, narratives from the *techno-enthusiasts* and *techno-critics* were triangulated. Claims were contrasted against secondary data sources. Codes were balanced on both sides of the argument. This approach promoted generative and comparative questions, such as: How can you trust unregulated code? Why is value represented by digital code? When will a crypto-asset become decentralized? Following open coding, axial coding was then performed to make connections between categories and subcategories. This helped refine our twenty-seven first-order concepts, developed the twelve second-order themes and the four distilled aggregate dimensions. This is shown in Table 2.

Table 2 Data Analysis and Codes

Concepts (Open)	Themes (Axial)	Aggregate (Selective)
<ul style="list-style-type: none"> • Financial inclusion [inv 5] • Cryptographic security [inv 3] • Cybersecurity [cpt 4] • Data theft [reg 3] • 51% attack [inv 1] • Hype [inv 2] 	<ul style="list-style-type: none"> • Absence of any AML or KYC practices reduce confidence • Immutable because blockchain is decentralized • Code executes as written removing need for any 3rd party oversight 	Trust
<ul style="list-style-type: none"> • PoW vision [cpt 1] • BTC protocol [cpt 4] • Disruptive and irreversible [reg 3] • Inchoate technology [reg 2] • Relentless improvement [inv 3] • Consensus based [inv 1] 	<ul style="list-style-type: none"> • Complex and fast evolving crypto ecosystem • High correlation between all BTC crypto markets • Blockchains developed for many distinct types of operation 	Crypto Technology
<ul style="list-style-type: none"> • Open-source [cpt 1] • Interconnected nodes [cpt 2] • Faster cross boarder payment [cpt 5] • Elimination of fees [inv 4] • Volatility [reg 2] • Peer-to-peer [inv 1] • Asset-referenced tokens [inv5] 	<ul style="list-style-type: none"> • Increased efficiency between two private transactions • Replacement of government control of banks • Government does not control an individual's currency 	Decentralized Finance
<ul style="list-style-type: none"> • Replacement of fiat currency [cpt 2] • Turf war between SEC and CFTC [inv 4] • Record fines [reg 3] • Self-regulatory process [reg 2] • Novel, rapidly evolving [inv 3] • Unintended outcomes [reg 1] • Redundant legacy rules [cpt 5] • Control stifles innovation [cpt 3] 	<ul style="list-style-type: none"> • Regulatory oversight by each body on market activities • Application of existing rules to new asset types • Investor protection is essential as markets grow 	Regulation

To answer our research questions, we selected participants who were actively involved in the BTC market. The scope was tightly focused on the foundational concepts of digital assets. Membership of Global DCA ensured each informants' subject familiarity. This influences the smaller sample size needed for theoretical saturation. While the sample size is justified, it is important to acknowledge a potential limitation: participants were selected through Global DCA, which may introduce bias, as these individuals are likely to be more engaged with or supportive of the cryptocurrency industry. Additionally, the timing of the interviews, conducted at the end of the "crypto winter," may have influenced participant perspectives, potentially heightening skepticism, caution, or defensiveness in their narratives.

Although only thirteen interviews were conducted, we were able to develop concepts and themes that supported our model. For clarity, Table 2 only shows one informant per concept, although almost all had many more. No new concepts or insights were collected during the last interviews with informants from these groups, precisely because of this tight focus.

4. FINDINGS

The findings are presented in the form of two contrasting narratives: one representing the perspectives of crypto techno-enthusiasts, the other reflecting the views of crypto techno-critics.

Table 2 summarizes these polarized views across the four key thematic areas: Trust, Crypto Technology, Decentralized Finance, and Regulation.

Table 2: Interview Data and Themes

Theme	Crypto Techno-Enthusiasts	Crypto Techno-Critics
Trust	<p><i>"Bitcoin is a store of value. If it is backed by a highly liquid asset like US\$ then it can become a default payment system" [cpt 2].</i></p> <p><i>"Altcoins such as Ether are a testament to the success of Bitcoin."</i></p>	<p><i>"Crypto creates fraud and is a threat to security. It supports terrorists, human traffickers, cyber criminals, blackmail, and sanctions evasion" [inv 2].</i></p> <p><i>"Money can be seen as a medium of exchange, a unit of account and a store</i></p>

	<p><i>Most people now want an alternative to the government controlling our money” [inv 5].</i></p> <p><i>“Crypto is valued the same way as fiat - trust. If enough people think that Bitcoin or Ethereum have value, then they do.” [inv 3].</i></p> <p><i>“We believe Bitcoin has done what it set out to do - replaced our trust in money with a trust in technology. Why else have so many people bought these coins?” [cpt 1].</i></p>	<p><i>of value. Crypto does none of these. It’s a gamble in a zero-sum game of chance” [reg 1].</i></p> <p><i>“The regulator must give clear guidance on accountability to safeguard each investor and protect against moral hazards” [reg 3].</i></p> <p><i>“For most of us, the word ‘Trust’ actually means a leap of faith – do you really understand how it all works and where your money is?” [inv 1].</i></p>
Crypto Technology	<p><i>“It is software that is used to create any digital asset, but it is not the code that has committed any crime” [cpt 4].</i></p> <p><i>“Banks don’t want to see any disruption to their existing financial services. But this new code allows all transactions to be faster and more secure. They don’t want to see control lost to anything more efficient and productive” [cpt 5].</i></p>	<p><i>“The crypto economy is just lines of code that create more code that is stored in a blockchain. This is all about conveying legitimacy through sophisticated technology” [reg 2].</i></p> <p><i>“Blockchain is an immature technological development, and when used in proof-of-work damages the environment” [reg 3].</i></p>
Decentralized Finance	<p><i>“Of course you can trust what the code is doing. Its open source and that makes all events transparent. But its decentralized so the consensus from the nodes makes it secure” [cpt 1].</i></p> <p><i>“No company controls Bitcoin or decides how it is mined, precisely because its decentralized. There is no central authority controlling how or where this is done” [cpt 2].</i></p>	<p><i>“These crypto companies present their products as DeFi, but their economic impact is clearly centralized. If Bitcoin was linked to fiat, it would crash the economy.” [inv 2].</i></p> <p><i>“Nearly all crypto supporters will tell you that it is decentralized. It is not. Most crypto payments use stablecoins, and this is dominated by Tether and Circle” [inv 4].</i></p>
Regulation	<p><i>“Regulation will stifle innovative software development, and this simply stops investment” [cpt 3].</i></p> <p><i>“How can you use controls developed for governance and impose them on decentralized entities?” [inv 4].</i></p> <p><i>“A strong reason to own any crypto is that you control it – the state cannot block your account or take it away from you” [cpt 4].</i></p>	<p><i>“The moment you regulate it changes how people view crypto. Investors would assume that all government controls placed on assets now apply to crypto. And this is simply not the case” [reg 2].</i></p> <p><i>“We need measures to stop private firms managing investor funds without full surveillance. This is a real problem when a firm operates outside our jurisdiction” [reg 1].</i></p>

The narrative accounts provide a nuanced understanding of the diverse views and opinions that revolve around competing visions of the role of crypto-assets. Specifically, techno-enthusiasts emphasize the transformative potential and disruptive nature of trustless, liberating technology, while techno-critics focus on the risks, instabilities, and regulatory challenges associated with

this potentially harmful asset class. Based on these interviews, what follows is an overview of the tensions that reflect broader ideological divides over trust, technology, finance, and regulation.

4.1. Trust

Supporters of crypto-assets replace human trust with trust embedded in computer code. The implication is that technology is neutral and less risky than financial systems operated by human actors. Tension is demonstrated as critics see it as a risky, unregulated tool enabling illicit activities and lacking intrinsic value.

- Techno-Enthusiasts - view BTC as a store of value and a viable alternative to government-controlled fiat currency. Believe that trust in code replaces trust in centralized institutions, emphasizing transparency and decentralization. Argue that crypto's value is derived from collective belief, like fiat.
- Techno-Critics - Associate crypto with fraud, criminal activity (e.g., ransomware, terrorism), and lack of investor protection. Criticize crypto for failing to function as traditional money (medium of exchange, store of value). Highlight the need for regulatory oversight to prevent moral hazards and protect investors.

4.2. Crypto technology

Narratives on crypto-assets reflect divergent views and opinions about the technological artifact. The tension is evident as one side argues that this revolutionary code operates as originally programmed, whilst the other perceives risks as unforeseen outcomes from untested code that is environmentally harmful, overhyped, and lacking tangible benefits.

- Techno-Enthusiasts - frame blockchain as neutral, secure, and disruptive to inefficient legacy systems (e.g., banks). Emphasize innovation, efficiency, and resistance to censorship.
- Techno-Critics - dismiss crypto as speculative “lines of code” with no real-world utility. Criticize blockchain’s environmental impact (e.g., energy-intensive PoW) and immaturity as a technology.

4.3. Decentralized Finance

Enthusiasts idealize DeFi as a libertarian alternative to traditional finance because they see this as robust and open-sourced structures, allowing code to be developed and reviewed in the public domain. Tensions are evident as critics view technology as dynamically complex, with decentralized systems making it difficult to evaluate how code interacts.

- Techno-Enthusiasts - celebrate open-source transparency and elimination of intermediaries (e.g., banks, governments). Argue that decentralization ensures security and autonomy for users.
- Techno-Critics contend that DeFi is de facto centralized (e.g., dominated by firms like Tether and Coinbase). Warn that linking crypto to fiat could destabilize economies.

4.4 Regulation

Whilst the absence of regulation is presented as essential to encourage innovative technological development, whose products improve market efficiency, this has opened the door for nefarious activity. One regulator commented that “...*crypto offers no services, products, or revenue streams, and in effect gives no value to the economy*” [reg2]. This highlights the ongoing tension between the sentiment-driven nature of crypto-asset markets (where regulation is a threat to crypto’s

foundational principles) and the desire for more fundamental economic anchors (essential for market stability and consumer protection).

- Techno-Enthusiasts - oppose regulation, claiming it stifles innovation and contradicts crypto's decentralized ethos. Frame state control is antithetical to individual financial sovereignty.
- Techno-Critics - demand regulation to protect investors, prevent fraud, and ensure jurisdictional accountability. Highlight risks of unregulated firms (e.g., Binance) operating outside legal frameworks.

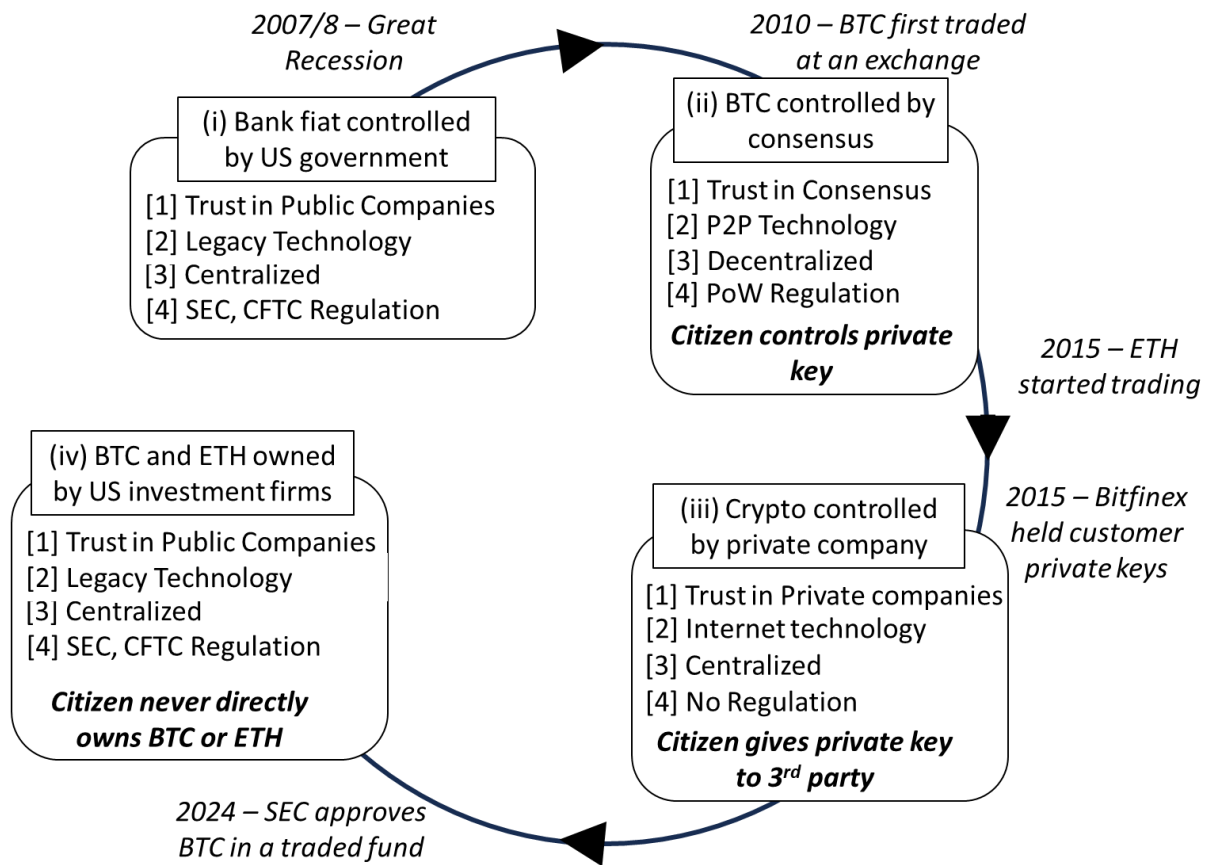
The next section explores how the crypto environment, described in Nakamoto's white paper, has been adapted by vendors offering crypto services both for BTC and altcoins. Some share the BTC decentralized methodology, while others are owned by private companies.

5. DISCUSSION

Our findings reveal a *Paradox of Institutionalized Decentralization* (Beck et al., 2018), wherein BTCs delivery through exchange-traded funds (ETFs) and custodial services contradicts its foundational ethos of decentralization and trustlessness, where users were meant to transact without intermediaries or custodians. This aligns with Bakos et al.'s (2021) observation that permissionless systems often recentralize in practice due to institutional adoption and mining concentration. Simultaneously, *Protocol Drift* (Gervais, 2010) is evident in BTCs compliance with SEC regulations, reflecting Paech's (2017) argument that blockchain systems inevitably adapt to traditional legal and financial norms. Finally, *Hybrid Governance* (Vergne, 2020) emerges as a contested interplay between on-chain autonomy and off-chain regulation, challenging deterministic views of decentralization and supporting Rossi et al.'s (2019) call for a more nuanced understanding of governance in decentralized systems.

These theoretical insights are reinforced by our empirical model of the evolution of the crypto ecosystem (Figure 1), which illustrates four distinct phases in BTC (and other alt-coins) institutional trajectory.

Fig. 1 Evolution of the Crypto Ecosystem



Each phase does not represent a hard stop, where processing moves from one type to another. Rather, it is when a new trading mechanism is developed. Organizations in every phase exist concurrently. These phases are described below:

- Pre-2009 onwards: Traditional fiat systems dominated by centralized banks. This is represented by ‘Bank fiat controlled by the US government.’ Investors went to the banks and withdrew cash.

- 2009 onwards: Emergence of decentralized P2P systems aligned with Nakamoto's vision. This is represented by 'BTC controlled by consensus,' with an individual's holdings saved in their private wallet(s). The private key(s) were securely managed by the wallet holder.
- 2015 onwards: Rise of centralized crypto firms (e.g., FTX) acting as de facto intermediaries. This is represented by 'Crypto controlled by private company.' An individual's private key is held by an unregulated third party (e.g., Binance). These companies presented themselves as having rigorous controls.
- 2024 onwards: Traditional institutionalization through regulated ETFs and custodial services offered by legacy financial institutions (e.g., Fidelity). This is represented by BTC and ETH owned by US investment firms. An individual's ownership of BTC (bought with USD) is managed by a public company (e.g., BlackRock). These finance companies own the crypto-assets (e.g., BTC).

This progression exemplifies how decentralized ideals are gradually absorbed into centralized infrastructures, echoing Christensen's (1997) theory of technological co-optation. *The Paradox of Institutionalized Decentralization* is most visible in the fourth phase, where Bitcoin is no longer exchanged P2P but through regulated ETFs. For many, individual wallets have been replaced by private companies that manage investors' private crypto keys, just as a bank holds its customers' fiat. Nakamoto's paper discusses sharing the public key, citing Merkle's 1980 paper "*Protocols for public key cryptosystems*". A public key is analogous to an email address (which can be shared), and a private key is the password to access an email client (and at no time is it shared). Crypto private keys prove ownership and are used to manage digital assets. This is precisely the kind of trusted third party Nakamoto sought to eliminate.

Similarly, *Protocol Drift* is evident in the adaptation of BTC infrastructure to accommodate regulatory frameworks. Our interviews with regulators and investors confirm that compliance with KYC/AML and SEC oversight has become a prerequisite for institutional legitimacy. This drift is not merely technical but ideological, as BTCs original anti-establishment ethos is diluted by its integration into traditional finance.

Finally, the *Hybrid Governance* model is reflected in the unstable coexistence of decentralized code and centralized oversight. While BTC protocol remains open-source and consensus-driven, its market behavior is increasingly shaped by off-chain actors/regulators, custodians, and institutional investors. This hybridity is not a stable equilibrium but a site of ongoing negotiation, as evidenced by the conflicting narratives of techno-enthusiasts and techno-critics in our interviews.

Table 3 further illustrates this transformation by juxtaposing Nakamoto’s original design principles with the current market reality. Each thematic area (technology, trust, decentralization, and regulation) has undergone a shift from idealized decentralization to pragmatic centralization. These shifts are not merely technical adaptations but reflect broader institutional pressures and market logic.

Table 3 Nakamoto’s Crypto Vision and Today’s Crypto Ecosystem

Theme	Nakamoto’s Vision (Nakamoto, 2008, pp. 1)	Crypto Market Evolution – Post-2009
i. Crypto Technology	<i>“The network timestamps transactions by hashing them into an ongoing chain of hash-based proof-of-work.”</i>	Today, the amount of energy consumed by mining blockchains exceeds the energy requirement of Belgium. This is a concern for carbon-neutral policies.
	<i>“...an electronic payment system based on cryptographic proof instead of trust.”</i>	It is not the data mining protocol used to create a consensus that is a cause for concern. It is any code developed and used by private, centralized crypto companies.
ii. Trust	<i>“...the main benefits are lost if a trusted third-party is still required to prevent double-spending.”</i>	Today, investors purchase BlackRock’s iShares BTC Trust and expect BlackRock to manage their \$ and BTC positions.

	<i>“Commerce on the Internet has come to rely almost exclusively on financial institutions serving as trusted third parties to process electronic payments.”</i>	Binance.com declared that <i>“they did not want to be regulated, ever.”</i> The replacement of financial intermediaries, overseen by accountable regulators, by unaccountable crypto companies has nothing to do with Nakamoto’s vision.
iii. Decentralized Finance	<i>“A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another.”</i>	A small number of centralized exchanges (of which FTX was once a leading example) have cornered the market for trading with millions of customers.
	<i>“While the system works well enough for most transactions, it still suffers from the inherent weaknesses of the trust-based model.”</i>	Following FTX’s collapse, Coinbase released a statement in The Wall Street Journal: <i>“...people put their money and trust with people who don’t deserve it.”</i> But this “trust” has nothing to do with the P2P model proposed by Nakamoto.
	<i>“The system is secure as long as honest nodes collectively control more CPU power than any cooperating group of attacker nodes.”</i>	BTC and ETH are mined by decentralized nodes. Crypto organizations like Terraform Labs mine their own blockchain. There is no consensus to validate any timestamp.
iv. Regulation	<i>“...without going through a financial institution.”</i>	Following the SEC authorization of ETF, financial instruments that contain BTC are now sold by large investment organizations (e.g., BlackRock, Fidelity). BlackRock’s fund trades on the Nasdaq.
	<i>“The cost of mediation increases transaction costs.”</i>	The decentralization of regulation has produced its own sui generis risk profile. Crypto companies charge for their services.

In sum, our findings suggest that BTC evolution is not a linear path toward decentralization but a cyclical negotiation between ideology and institutionalization. The vision of a trustless, P2P financial system has been reshaped by the very forces it sought to disrupt. This has profound implications for how we theorize digital responsibility, governance, and the future of decentralized finance.

5.1 Empirical Illustration: The Evolution of Bitcoin’s Institutional Trajectory

To further illustrate the theoretical tensions discussed above, this section traces the empirical evolution of Bitcoin’s ecosystem. It shows how the ideals of decentralization have been

progressively reshaped by institutional forces, culminating in the hybrid financial structures we observe today.

The foundation of BTC is the underlying computer code. The relative ease with which similar crypto-assets can be developed has led to the creation of over twenty thousand altcoins. To facilitate trading in this burgeoning virtual asset market, numerous centralized support services have emerged alongside the cryptocurrencies themselves. Investors no longer need to rely solely on P2P crypto-asset blockchains. These new crypto exchanges, lending platforms, and brokerages offer custodial wallet services, effectively holding investors' BTC and private keys on their behalf. By entrusting their private keys and digital assets to these centralized crypto service providers, investors can access various financial offerings. For example, they may be able to earn returns by their crypto holdings being lent to third parties, just as banks lend deposits to other institutions. Investors may also be charged digital fees for any transaction executed by these centralized platforms.

Over time, a growing number of altcoins were developed as more private companies created their own digital assets. To facilitate BTC and altcoin trading, additional crypto companies emerged to provide exchange-like services and activities. Decentralized mining was no longer a prerequisite for the creation of new crypto tokens. Companies like Terraform Labs, FTX, Binance, and many others developed their own proprietary coins (TerraUSD, FTT, and BNB). These companies are all trusted third parties - exactly the organization that Nakamoto was arguing had to be replaced. As described in Nakamoto's white paper, "*...only coins issued directly from the mint are trusted not to be double-spent. The problem with this solution is that the fate of the entire money system depends on the company running the mint, with every transaction having to go through them, just like a bank*" (Nakamoto, 2008, p. 2). Here, the mint is a company (e.g., Terraform Labs) that is

controlling the production of all its digital tokens. It is important to note that BTC itself does not rely on such centralized token issuance mechanisms. Are principles fundamental for BTC inconvenient for other crypto-assets to follow?

The private, unregulated, and centralized nature of many crypto companies stands in stark contrast to the original ideals where trusted third parties were replaced by cryptographic proof. As BTC gained traction in the market, the narrative of decentralized finance was empirically examined, as the elimination of all trusted intermediaries was not evident (Bakos et al., 2021). On January 10th, 2024, approval was given by the SEC for BTC ETFs (SEC, 2024). This allowed investors to purchase BTC through familiar financial channels, perhaps because of perceived regulatory safety, motivations such as profit or support of its ideology (Mattke et al., 2020). Later in July, ETH was also given approval to be included in different ETFs. At the end of September 2024, there were twenty-seven firms trading spot ETH and thirty-six firms trading spot BTC as part of an ETF. By January 2025, approval had been given for a combined BTC and ETH fund (SEC, 2025).

Investors can purchase digital assets through an ETF (e.g., BlackRock's IBIT) on centralized, regulated exchanges (e.g., NYSE). Willing parties interact with traditional firms that record each transaction on their centralized computers. Has Nakamoto's crypto vision fundamentally changed the way financial markets operate, or are financial institutions now accessing another source of income? In February 2024, Seattle-based Eigen Labs raised \$100 million to develop a system enabling users to "re-stake" their digital assets, allowing the same collateral to be used across multiple protocols (Stafford, 2024). While not directly tied to BTC, this innovation reflects a broader trend in decentralized finance toward financial engineering practices reminiscent of traditional markets. Such mechanisms resemble rehypothecation, a practice that contributed to the collapse of Lehman Brothers in 2008 (Singh & Aitken, 2009), raising concerns about systemic risk

in the evolving crypto ecosystem. This development underscores how DeFi is increasingly replicating the risk structures of traditional finance, challenging the notion that decentralization inherently reduces systemic vulnerability.

This empirical trajectory underscores the central argument of this paper: that BTCs evolution reflects a dynamic negotiation between ideological decentralization and institutional assimilation, with profound implications for digital responsibility and governance.

This four-phase evolution of the BTC ecosystem illustrates the interplay between our three theoretical constructs. The early P2P phase (2009–2015) aligns with Nakamoto’s vision of trustless decentralization. However, the rise of centralized exchanges (from 2015) marks the onset of *Protocol Drift*, where off-chain actors begin to shape the ecosystem. The institutionalization phase (from 2024), characterized by ETFs and custodial services, exemplifies the *Paradox of Institutionalized Decentralization*, as Bitcoin’s infrastructure becomes reliant on the very intermediaries it sought to eliminate. Across all phases, *Hybrid Governance* emerges as a persistent tension between on-chain autonomy and off-chain regulation, reflecting the unstable coexistence of code and law.

7. CONCLUSION

Nakamoto’s seminal paper has spearheaded narratives on digital assets and blockchain technology. Published at the start of the Great Recession, it proposed an alternative to fiat currencies and the control imposed by banks and governments. By recording transaction data in an immutable decentralized blockchain through cryptographic hashing, the need for trust in any centralized third-party organization was, it was claimed, effectively eliminated. This paper did not consider the many thousands of competing crypto-assets, alternative consensus mechanisms (e.g., PoS), stable coins, NFTs, or DAOs that would also be created. BTC began as the

replacement for fiat, but now competes with every other digital asset and token vying for investors' attention. The proliferation of altcoins has led to the emergence of numerous crypto exchanges, lending platforms, stablecoin issuers, hedge funds, and brokerage services.

This study contributes to IS research by conceptualizing three interrelated dynamics - *Paradox of Institutionalized Decentralization*, *Protocol Drift*, and *Hybrid Governance* - that explain how decentralized technologies are reshaped by institutional forces. For policymakers, our findings suggest that regulatory frameworks must account for the hybrid nature of crypto ecosystems, where decentralized code and centralized institutions coexist. For practitioners, especially institutional investors, understanding this hybridity is essential for managing risk and trust in digital asset markets.

The evolution of BTC reveals not a failure of decentralization, but its transformation under institutional pressures. Future research should explore how these pressures shape the governance of emerging digital assets and whether new forms of decentralization can emerge within regulated environments. Research is needed to interrogate how trading patterns and investor behavior change because of these new regulated crypto investment products. If BTC continues to rise in price, current token owners may simply choose to hold their positions in search of greater profits rather than using it to trade. There is also the possibility that ETFs could expand to incorporate cryptocurrencies with much lower market capitalization (for example, Meta has created Libra). These questions are highly relevant for future studies aimed at understanding the ongoing development and transformation of the broader crypto-asset market landscape. Today, the largest global financial institutions offer regulated products that contain unregulated digital assets. In sum, centralized legacy institutions, which decentralized finance originally sought to

displace, now offer access to digital assets, blurring the line between permissionless innovation and institutional control.

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Ethics approval and consent to participate

All interviewees consented to the publication of their anonymous comments.

Consent for publication

Authors A.A. and A.B. both consent to the publication of this paper.

Availability of data and material

Data analyzed in this study are included in this article.

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Authors' contributions

Conceptualization, A.A. and A.B.; methodology, A.A. and A.B.; formal analysis, A.A. and A.B.; investigation, A.A. and A.B.; writing—original draft preparation, A.A.; writing—review and editing, A.B. All authors have read and agreed to the published version of the manuscript.

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