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Proposals in Decentralized Autonomous Organizations: Exploring Their Characteristics and Impact on Decentralized Governance

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Abstract

This study examines the key characteristics of proposals made in decentralized autonomous organizations (DAOs) and their impact on decentralized governance. Using a quantitative cross-sectional approach, 4,769 proposals from 91 unique protocol DAOs were analyzed. The key findings are that DAO proposals tend to be concise, the voting period is short, and voting options are simple. These findings suggest a preference for efficient decision-making. Most proposals achieved high rates of consensus, with winning ratios of 80% or higher. Community-related activities dominated the proposal categories, accounting for 70.1% of all proposals. This study also found that increasing the number of supported networks and assets correlated with higher voter participation but lower winning ratios. This finding highlights the complexities that come with multichain governance. This study contributes to existing knowledge of DAO governance by analyzing the characteristics of proposals and their implications for decentralized governance. The findings offer valuable benchmarks for future research and practical considerations for DAO participants who wish to optimize governance processes.

Keywords*:* decentralized autonomous organizations (DAOs), blockchain governance, proposal characteristics, decentralized decision-making, Snapshot.org, protocol DAOs, voting behavior, consensus mechanisms, multichain governance, quantitative analysis

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List of Abbreviations

API Application Programming Interface

BTC Bitcoin

DAOs Decentralized Autonomous Organizations

DeFi Decentralized Finance

DID Decentralized Identifier

DLT Distributed Ledger Technology

ENS Ethereum Name Service

ETC Ethereum Classic

ETH Ethereum

ETF Exchange-Traded Fund

JSON JavaScript Object Notation

MKR Maker

NFT Non-Fungible Token

NLTK Natural Language Toolkit

PCA Principal Component Analysis

PoS Proof of Stake

SEC U.S. Securities and Exchange Commission

SPSS Statistical Package for the Social Sciences

TF-IDF Term Frequency-Inverse Document Frequency

UST TerraUSD

WCSS Within-Cluster Sum of Squares

Introduction

In the rapidly changing digital economy, the blockchain industry has expanded significantly. In fact, within a few years, it has transitioned from a cyberpunk niche to a multibillion-dollar industry. Since the recent launch of the bitcoin exchange-traded fund (ETF), a total of 14,452 million dollars in bitcoin have been accumulated (Farside Investors, 2024). This growth has not been without challenges, including the bankruptcy of FTX Trading Ltd., the failure of the algorithm stablecoin UST (TerraUSD), and various charges brought by the U.S. Securities and Exchange Commission (SEC) against major players, such as Binance, Coinbase, and Consensus. Crypto, often described as the "Wild West" by SEC chairman Gary Gensler, is therefore seen as a volatile and risky market (Wagner, 2024). Given their high price fluctuations, scams, and legal risks, many investors avoid the crypto markets.

In parallel to this growth is the rise of decentralized autonomous organizations (DAOs), especially in decentralized finance (DeFi). DAOs represent a new form of organizational structure and governance, and their decentralized governance and member-driven decision-making processes pose a challenge to traditional organizations.

A DAO, initially defined as a "coded organization" by Larimer (Rikken et al., 2021), uses code to guide decision-making based on blockchain activity (Bellavitis et al., 2022). This code is written into a smart contract, which creates computational agreements between parties that may be self-executed or self-enforced (Faqir et al., 2020). Today, DAOs play a crucial role in governing blockchain protocols and incentivizing token holders to actively participate in decentralized governance by creating, discussing, voting on, and executing proposals. These proposals vary widely, from technical to marketing proposals, and fundamentally influence the DAO's direction and operations.

Every year, thousands of new DAOs are listed on platforms like DeepDAO or Snapshot.org. All these DAOs serve a purpose—from managing non-fungible token (NFT) communities to governing a blockchain or even buying physical art from an auction. Many DAOs fail, but some, like Uniswap, Gitcoin, or Bancor, succeed. This reality raises the following question: What enhances the survival probability of a DAO? According to Ralph C. Merkle (2021), a DAO survives if it performs a function that causes people to support it. Thus, DAOs that perform a service that humanity wants and that cannot be done better in any other way or by other DAOs will be richly rewarded.

Figure 1: *Decentralized Autonomous Organization*

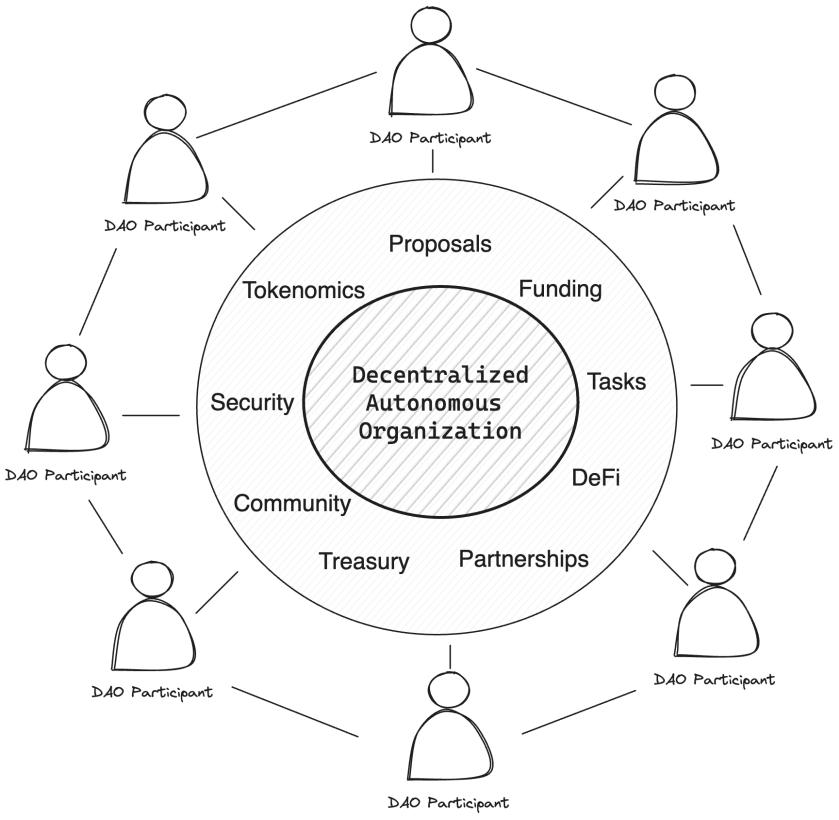


Fig. 1 is a diagram of the structure and main activities of a DAO. Activities vary greatly between the different types of DAOs, but most such organizations coordinate their activities based on a common goal and/or vision. To reach consensus, most DAOs use cryptocurrency tokens, or NFTs, which give you the right to vote on their proposals. If the

majority of the DAO participants agree on a proposal, it is up to the assigned DAO participants to implement the changes.

Most studies on DAOs have focused on their voting mechanisms and treasuries, or on legal aspects. However, there is a lack of research on DAO proposals and the ways in which the characteristics of proposals affect decentralized governance in DAOs. In this study, I examine DAO proposals, their characteristics, and how they affect the decentralized governance of DAOs. To achieve this goal, the following research question was formulated:

What are the key characteristics of DAO proposals, and how do they impact decentralized governance?

This study focuses on conducting descriptive research of data on DAO proposals. This involves the exploration of various characteristics of proposals, such as their content, voting data, and (inter)relationships. Analyzing these characteristics and relations can enhance our understanding of the ways in which they influence governance outcomes in DAOs.

The findings of this study are intended to contribute to the broader discourse on decentralized governance within DAOs and provide practical insights for the improvement of proposal practices in DAOs. This research will be of particular value to DAO creators, participants, and researchers who seek to familiarize themselves with the patterns and dynamics that characterize DAO proposals.

In summary, this study addresses a gap in the literature by focusing on the characteristics of DAO proposals and their impact on decentralized governance. This study aims to identify the key characteristics that shape governance dynamics in DAOs and offer evidence-based insights into the characteristics, trends, and relationships that influence decentralized decision-making processes by means of quantitative analysis of proposal-related data.

Theoretical Background

In my review of the literature, I considered research studies that focused on the main features of proposals in DAOs and how these proposals affected decentralized governance. Because there is limited research on DAO proposals, this review included literature on traditional corporations to provide further insights into the dynamics of proposals and their influence on decentralized governance.

The review is divided into three thematic topics: blockchain governance and DAOs, proposals and voting in DAOs, and decision-making in DAOs. I further divided these topics using the funnel approach, which allows for broader concepts to be explored before the focus is narrowed down (Sternad & Power, 2023). As a first step, I conducted a comprehensive systematic search. This step not only helps reduce the possibility of disparities and bias in the research but also the risk of reproducing already existing research (Aarhus University, 2024). I used keywords like DAO(s), decentralized finance, (proxy) proposals, governance, blockchain, decision-making, voting (behavior), and voting systems to find relevant literature. The relevance of the identified papers was then assessed based on the abstracts, keywords, and introductions. Next, relevant papers were listed in a literature review matrix for each thematic topic. The matrix review helps to identify differences and similarities between the research studies (Brandeis University, 2024).

The goal of this review is to explain the broader concepts, identify connections between themes and concepts within the literature, and identify the gaps in the literature that my study would seek to address.

Blockchain Governance and DAOs

On October 31, 2008, an anonymous person or group using the name Satoshi Nakamoto as a pseudonym released the Bitcoin whitepaper, titled “Bitcoin: A Peer-to-Peer

Electronic Cash System" (Nakamoto, 2005). Satoshi's vision was to create a peer-to-peer version of electronic cash that would allow online payments to be sent directly from one party to another without going through a financial institution (Nakamoto, 2005). By removing trust from the source, Satoshi introduced a trustless ledger that attracted massive attention and kickstarted various initiatives in different industries (Nofer et al., 2017). One reason for this enthusiastic response is the promise of increased efficiency by eliminating middlemen (Van Pelt et al., 2020).

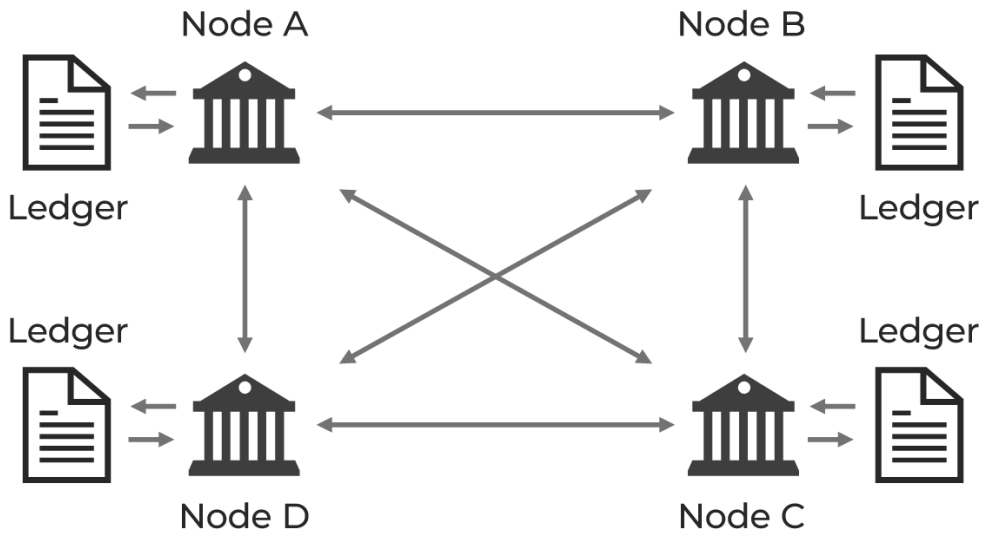
Early adopter Andreessen (2014) stated that Bitcoin represents a breakthrough in computer science that builds on 40 years of cryptography research and 20 years of cryptographic currency research conducted by thousands of researchers worldwide. This makes Bitcoin one of the most remarkable technological innovations of the 21st century (Kimani et al., 2020). However, early studies soon displayed skepticism and highlighted the disadvantages of Bitcoin, such as scalability, volatility, regulation, negative environmental impact, and hurdles to adoption (Golosova & Romanovs, 2018; Gurtu & Johny, 2019). While these innovations and their challenges have been extensively researched, the ongoing evolution and research of blockchain, the technology behind Bitcoin, will continue to shape the future.

Blockchain and Distributed Ledger Technology

Satoshi used the words "block" and "chain" separately in his whitepaper, but later it evolved into a single word, "blockchain." Blockchain, also known as distributed ledger technology (DLT), consists of data sets that are made up of a series of data packages, or blocks, each of which contains several transactions (Nofer et al., 2017). Blockchains can differ in their degree of decentralization, ranging from private, consortium, and public blockchains, depending on the requirements and design of the blockchain (Chu & Wang,

2018). A straightforward method to enhance decentralization involves increasing the number of nodes in the blockchain network (Chu & Wang, 2018). These nodes contribute to the blockchain by verifying and publishing transactions into blocks, thereby strengthening the network's security and reliability. Ultimately, a decentralized blockchain eliminates the need for a centralized third party (middleman) to ensure the authenticity of exchanges, allowing people who do not trust each other to engage in exchange relationships as can be seen in Fig. 2 (Cengiz, 2023; Chu & Wang, 2018).

Figure 2: *Overview of Distributed Ledgers (Sauliņa, 2023)*



The introduction of blockchain technology was followed by developments in smart contract platforms. Szabo (1997) was the first to introduce smart contracts, and Ethereum was one of the first to implement them (Buterin, 2014). Ethereum was one of the first platforms to introduce smart contracts, also known as programmable contracts, using blockchain technology (Buterin, 2014). Thus, Ethereum introduced many new-use cases in various real-life areas, like financial contracts, prediction markets, digital identity, supply chain management, healthcare, and tokenization (Kushwaha et al., 2022). In fact, numerous industrial developments on Ethereum have contributed to its reaching a notable market cap of $300 billion (Coingecko, 2024).

Recent studies on blockchains continue to highlight the transformative potential of blockchain technology across different sectors. Iansiti and Lakhani (2017) argue that blockchains could dramatically reduce transaction costs and become the system of record for all transactions, thus having a significant impact on the economy. This potential has sparked research interest in multiple fields.

Frizzo-Barker et al. (2020) found that most blockchain-related research focused on the fields of banking and finance, business, and law. However, during my search, many studies focused on the implications of blockchain on logistics. Most of these studies concluded that blockchain can play a key role in current logistics systems (Ahmad et al., 2021; Gurtu & Johny, 2019; Tijan et al., 2019). Despite the growing body of research, Frizzo-Barker et al. (2020) emphasized the need for more empirical research and theoretical development to collect data and analyze real-world applications of blockchain technology.

Blockchain Governance

In a blockchain network, a board or CEO is not required. Instead, the blockchain is controlled by its stakeholders. Governance is therefore crucial for the sustainability of a blockchain because it allows stakeholders to discuss and make decisions on the evolution of the blockchain (De Filippi & Loveluck, 2016). The stakeholders of the blockchain are known as miners, token holders, developers, and investors (Allen et al., 2021). The governance structures can vary among blockchains, influencing the decisions of companies to build on these blockchains (Van Pelt et al., 2020). For example, Bitcoin is governed using the proof of work (POW) consensus, where miners compete to solve complex mathematical puzzles to validate transactions. In contrast, Ethereum has transitioned to the proof of stake (POS) consensus, where validators are chosen to create new blocks based on the amount of Ethereum (ETH) they stake as collateral.

In Bevir's (2012, p. 19) definition, governance in general refers to "all processes of governing, whether undertaken by a government, market, or network, whether over a family, tribe, formal or informal organization, or territory, and whether through laws, norms, power or language." In the context of blockchain and Bevir's definition, blockchain governance refers to the process of governing a network, where stakeholders influence and control the blockchain network. Van Pelt et al. (2020) defined blockchain governance as the means of achieving direction, control, and coordination among stakeholders within the context of a given project to which they jointly contribute. In addition, Reijers et al. (2018) defined on-chain and off-chain governance, where on-chain governance refers to rules and decision-making processes that have been encoded directly into the blockchain, also known as the "rule of code" (De Filippi & Wright, 2018). All other processes that could have an impact on blockchain-based systems are referred to as off-chain governance (Reijers et al., 2018).

According to Van Pelt et al. (2020), governance *by* the infrastructure occurs when blockchain technology is used to more efficiently govern and coordinate existing actions, while governance *of* the infrastructure refers to the development, adoption, and maintenance of the blockchain itself. Cengiz (2023) argued that blockchain-based governance constructs are expected to compete against core centralized institutions, such as banks, centralized financial institutions, and firms, because of blockchain's trustlessness and programmability. Therefore, this scenario might lead to two worlds developing in parallel: a world where blockchain acts as the framework for the decentralized governance of socioeconomic relationships and a world where blockchain provides the infrastructure for heightened behavioral control and surveillance (Cengiz, 2023).

As the first decentralized autonomous organization, The DAO was the first to cause a governance dilemma on the infrastructure of Ethereum. A flaw in the splitting function in the

smart contract resulted in a 3.6 million Ethereum drain from The DAO smart contract (Cryptopedia [Cryptopedia Staff], 2023). In response, the community proposed a soft fork of the Ethereum network that would blacklist the attacker and prevent it from moving funds (*The DAO: What Was the DAO Hack? | Gemini*, n.d.; Konstantin, 2016). This suggestion was in direct conflict with the meta-constitutional principles of immutability and tamper-resistance. Consequently, the Ethereum Foundation later introduced the discussion of a more radical solution: hard-forking the chain (Cengiz, 2023; Wilcke, 2016). On July 20, 2016, the Ethereum network underwent a hard fork, creating two separate chains: Ethereum (ETH) and Ethereum Classic (ETC). ETH reversed the malicious transactions, while ETC maintained the original chain's immutability (Cryptopedia [Cryptopedia Staff], 2023). Both chains remain active today, highlighting the complexities and lasting impacts of governance decisions within blockchains (Faqir et al., 2020).

While recent studies have provided valuable insights into blockchain governance, our understanding of the impact of governance proposals on decentralized systems, especially within DAOs, remains limited. Future research should focus on the ways in which decentralized governance affects the development, adoption, and long-term sustainability of DAOs.

Definition and Significance of DAOs

With the introduction of smart contracts, the concept of coded organizations introduced by D. Larimer (2013) began to evolve, eventually leading to the creation of DAOs. A simple definition of a DAO is "an organization with a shared bank account," but this is an oversimplification. Various studies have provided more comprehensive definitions, as follows:

"A DAO is an internet-native entity with no central management which is regulated by a set of automatically enforceable rules on a public blockchain, and whose goal is to take a life of its own and incentives people to achieve a shared common mission" (Faqir et al., 2020, p. 2).

"A DAO is a blockchain-based system that enables people to coordinate and govern themselves, mediated by a set of self-executing rules deployed on a public blockchain, and whose governance is decentralised (i.e., independent from central control)" (Hassan & De Filippi, 2021, p. 2).

"According to Vitalik Buterin, a DAO is a pseudo-legal organization run by an assemblage of human and robot participants, where the robots are meant to be coded mechanisms that react to certain inputs" (DuPont, 2017, p. 159).

While the literature lacks consensus on the definition of a DAO, the common theme in the above-mentioned descriptions is their blockchain-based and community-driven nature and the absence of traditional management structures (Faqir et al., 2020; Hassan & De Filippi, 2021; S. Wang et al., 2019). DAOs represent a radical shift away from traditional, hierarchical corporate management structures towards a more democratic and transparent model of organizational governance, eliminating the risk of the middleman (Mark et al., 2016). An ideal DAO would have no central authority or management hierarchy, and its operational and management rules would be encoded on tamper-resistant blockchains and rely entirely on group collaboration and decision-making (S. Wang et al., 2019). In this way, the decision-making processes is automated, eliminating the need for human intervention or traditional oversight mechanisms.

Following the release of Ethereum, the first DAO was introduced as "The DAO," intended to act as an investor-directed venture capital firm (*The DAO: What Was the DAO Hack? | Gemini*, 2023). The DAO conducted a token sale and raised more than $150 million from more than 11,000 investors, marking it as one of the largest crowdfunding campaigns in history at the time (*The DAO: What Was the DAO Hack? | Gemini*, 2023). The DAO showed that the use of tokens in the blockchain network is not only a new way of raising funds or financing but also a new way of building a company's own ecosystem (Lee, 2019). This gives DAOs enormous potential to impact society, but further research and development are necessary before their potential can be fully realized (Despotović et al., 2023).

The DAOs of today serve a variety of purposes, ranging from leading DeFi protocols to funding public goods. One example is ConstitutionDAO, which started as an experiment and ultimately bid at a Sotheby's auction for a rare original copy of the U.S. Constitution (*ConstitutionDAO*, 2024). ConstitutionDAO rapidly gained attention and support, collecting over $40 million in cryptocurrency from thousands of contributors. Although ConstitutionDAO was ultimately outbid, its attempt showcased the potential of DAOs to mobilize resources quickly for a collective goal.

Another example is MakerDAO, which operates in DeFi. MakerDAO governs the Maker Protocol by deciding on key parameters through the voting power of MKR holders (MakerDAO, 2020). MakerDAO manages the DAI stablecoin, aiming to maintain its value close to one US dollar through a dynamic system of collateral-backed securities. Participants in the MakerDAO ecosystem use the MKR token to govern various aspects of the protocol, including risk management and collateral decisions.

Over the past four years, DAOs and their total treasury have seen remarkable growth of approximately 7,176% (*DeepDAO*, 2024). These treasuries primarily consist of liquid (native) cryptocurrency – DAO-managed assets are excluded from this (Allen et al., 2021;

DeepDAO, 2024). Beyond the treasury, every DAO consists of various components to facilitate decentralized governance, decision-making, and management. According to Q. Wang et al. (2022), these key components include the following:

- **Smart Contract:** A smart contract is code that is deployed in a blockchain environment, or the source code from which such code was compiled (De Filippi et al., 2021). A smart contract can be viewed as an autonomous system that ensures synchronization of both input and output upon reaching a consensus, all without the assistance of trustworthy third parties (Q. Wang et al., 2022)
- **On-Chain Identifier:** On-chain identifiers, also known as decentralized identifiers (DIDs), are not issued, managed or controlled by central parties (Q. Wang et al., 2022; W3C, 2022). An on-chain identifier refers to any subject (person, organization, thing, etc.) as the controller of the DID. Known examples of DIDs are Ethereum Name Service (ENS) names or Worldcoin IDs.
- **Off-Chain Snapshot:** A snapshot is a method for capturing the real-time state of data at a predetermined block height of the blockchain (Q. Wang et al., 2022). By using off-chain signatures and taking a snapshot, the on-chain transactions are significantly reduced. The platform Snapshot.org, which is the subject of the data in this study, takes its name directly from this technical phrase.
- **Stake/Governance Token:** Stakes are tokens that a holder can deposit into the system (Q. Wang et al., 2022). Similar to common stockholders of publicly traded companies, holders of governance tokens have the ability to vote on decisions made by the DAO (Makridis et al., 2023).
- **Reputation Mechanism:** Reputation can be measured by, for example, a member’s holding of governance tokens. This reputation can be used to determine

voting power in governance decisions, distribute rewards from the organization's treasury, or grant access to specific resources and privileges (Q. Wang et al., 2022). Reputation is vital to preserving trust and encouraging cooperation in DAOs.

- **Secure e-Voting Scheme:** Traditional electronic voting systems are still vulnerable to manipulation, despite their growth. The Sybil attack – when a person creates multiple false identities – is one of the most serious issues (Q. Wang et al., 2022). By giving voters access to an auditable copy of the voting record, blockchain-enabled e-voting (BEV) would enable voters to verify votes independently. If other voters noticed that the record was different from theirs, it would prevent any changes to the historic record (European Union, 2016).

DAOs are transforming organizational structure through blockchain technology, promoting decentralized, auditable transparency and democratic governance. Despite the rapid growth and potential of DAOs, several critical gaps and challenges need to be addressed. For example, clear definitions of the governance frameworks within DAOs are lacking. This lack of clarity must be addressed.

This study aims to contribute to addressing this gap by examining the key characteristics of DAO proposals and their impact on decentralized governance. By analyzing a large dataset of proposals from various DAOs, this research seeks to provide empirical insights into the governance frameworks and decision-making processes within DAOs.

Proposals and Voting in DAOs

Proposals are essential tools for guiding decision-making and strategic initiatives in various sectors, including corporate businesses, non-profit organizations, and DAOs.

Proposals offer a structured framework within which to present a rationale and outline, the benefits, feasibility, costs, and potential impact of suggested actions. According to Fan et al. (2024), DAO proposals and voting share similarities with conventional organizations. However, the authors also identified major differences. For example, within most DAOs, any member can initiate a proposal (Fan et al., 2024). Additional differences are listed below.

Table 1: *Comparison of DAO Voting and Conventional Voting (Fan et al., 2024)*

DAO Voting	**Conventional Voting**
Equal position among members	Hierarchical positions
Generally, proposals can be initiated by any member in any aspect.	Proposals are for typical issues, and most members do not have the right to make proposals.
Usually, all members have voting rights.	Voting may not be open for everyone in the organization.
Voting processes are automated through smart contracts.	Voting processes usually require manual handling and rely on internal trust.
Voting powers are usually token-based and democratically distributed.	Voting powers are heavily influenced by status and wealth.
Voting processes are all transparent.	The public has limited access to voting processes.

These differences identified by Fan et al. (2024) highlight the unique nature of DAO governance, emphasizing its potential for inclusivity, transparency, and decentralization. However, the differences also indicate areas where challenges may arise in the governance process of DAOs. By studying these differences, researchers and practitioners can better understand DAO governance and contribute to the development of more effective DAOs.

This study aims to build upon these identified differences by providing a comprehensive analysis of DAO proposal characteristics. This analysis will be particularly valuable for DAO creators, participants, and researchers seeking to optimize governance structures and decision-making processes in decentralized organizations.

Role and Importance of Proposals in DAO Governance

In corporate governance, proxy proposals and shareholder proposals are key tools that allow shareholders to influence company policies. On the one hand, a proxy statement is a document filed by publicly traded companies before the annual shareholder meetings to give shareholders the necessary information to make informed votes (Farnham, 2023). On the other hand, a formal document recommendation that a shareholder submits to a publicly traded company, urging the company to pursue a particular course of action, is known as a shareholder proposal (McGuire, 2012). While previous research has found that shareholder proposals typically have minimal impact on corporations (Buchanan et al., 2010), a study done by Renneboog and Szilagyi (2011) concluded that proposals that win a majority of the shareholder vote can no longer be ignored due to heavy reputational penalties. This finding sounds a warning that ignoring proposals could mean the end of the DAO because proposals are an important part of its democratic and decentralized governance. Therefore, it is important to understand how proposals work within DAOs, as low proposal approval rates and long voting durations can limit the development of DAOs (Fan et al., 2024).

A study by Maug and Rydqvist (2008) examined whether shareholders vote strategically during annual general meetings when they screen the management proposal. Their findings revealed that not only do shareholders vote strategically but also that proposal screening effectively enhances value. In addition, Renneboog and Szilagyi (2011) argue that the quality of the governance influences the voting outcome and price effects during the

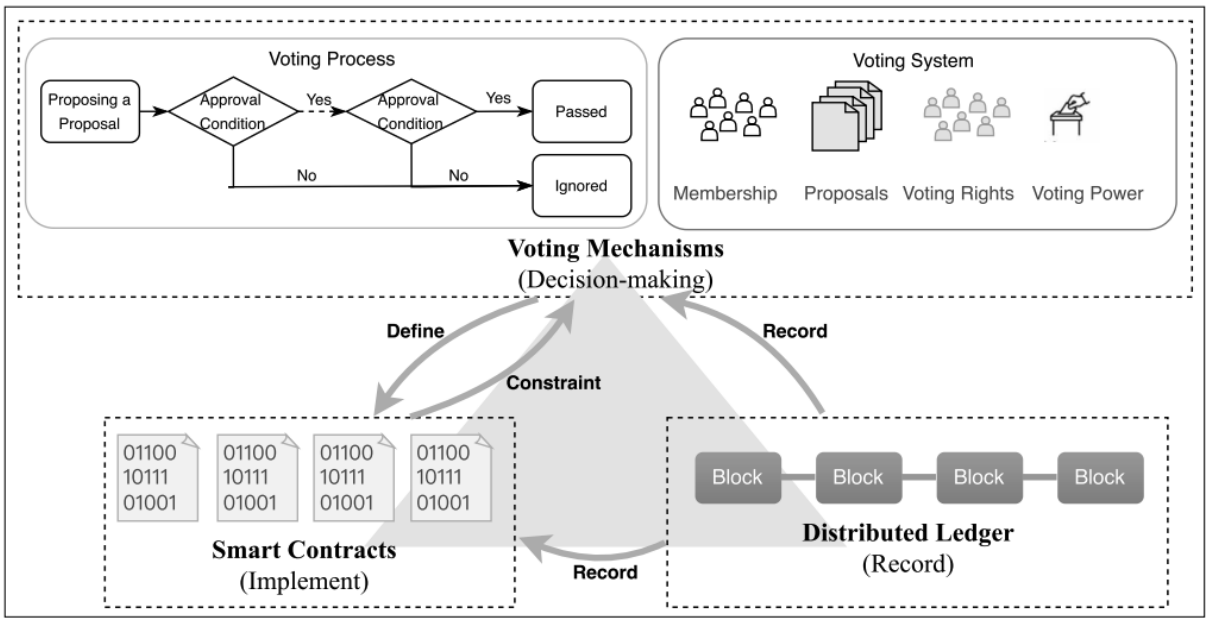
announcement period. These insights underline the calculated approach that shareholders take in traditional settings and how this affects the voting outcome. This raises the question of whether DAO members vote strategically and whether proposal screening adds value. Although proposals and voting procedures in corporate firms and DAOs have similarities and differences, as shown in Table 1, it is still unknown whether these findings in corporate organizations apply to DAOs.

Research on the characteristics of DAO proposals will not only improve the understanding of the processes and differences but also contribute to the overall effectiveness of DAOs. By analyzing a large dataset of DAO proposals, this study aims to highlight the strategic voting behaviors in DAOs, the value of proposal screening in decentralized contexts, and how governance quality influences voting outcomes. These insights will be crucial for optimizing DAO governance processes and enhancing their overall effectiveness.

Structure and Components of DAO Proposals and Voting

In traditional corporate governance, proposal formats are often standardized. In contrast, DAO proposals lack a universal template or process. Consequently, no simple and direct process exists for writing, submitting, and evaluating a DAO proposal. Most proposals try to convince the reader of the credibility, achievability, and practicality of the proposal (Sudheesh et al., 2016). The goals of proposals in DAOs vary, ranging from technical changes to community initiatives. This section focuses on the essential components of DAO proposals and the voting process, drawing on the DAO governance triangle formulated by Fan et al. (2024). The components are depicted in Fig. 3 and explained below.

Figure 3: *DAO Governance Triangle* (Fan et al., 2024)



- **Membership:** In most cases, obtaining the native token entitles one to membership. The decentralization of membership strives for relatively equal status among participants (Fan et al., 2024).
- **Proposals:** The actual message that tries to convince the DAO members of the credibility, achievability, and practicality of the proposal (Sudheesh et al., 2016). Most DAOs are permissionless, but some DAOs have increased the requirements for submitting a proposal (Fan et al., 2024).
- **Voting Right:** According to Fan et al. (2024), a voting right refers to the ability to make proposals and vote. Some DAOs, such as Bancor and Arbitrum, require members either to hold a minimum threshold of tokens or to be whitelisted before they can submit a proposal (*Snapshot*, 2024b).
- **Voting Power:** In most DAOs, voting is token-based, meaning that the distribution of voting power is primarily based on the quantity of tokens held by a voter. Voting power is defined as the value or number of votes a member has on a proposal (Fan et al., 2024).

- **Distributed Ledger:** The voting activities must be recorded to the selected blockchain by the distributed ledger, which ensure that the data is unchangeable and verifiable (Fan et al., 2024).
- **Smart Contracts:** The distributed ledger and smart contracts eliminate the need for human maintenance (Fan et al., 2024). Smart contracts include on-chain voting techniques such as quadratic voting, cross-chain voting, and token-lock voting (Zhu et al., 2023).
- **Voting Process:** The foundation of all DAO voting processes is the proposal, which is followed by the collection of votes, verification with approval conditions, and execution of results (Fan et al., 2024).

Fan et al. (2024) DAO governance triangle provides a comprehensive framework for understanding the key elements of DAO governance. However, most studies on DAO voting and/or proposals provide either an overview or a focus on specific aspects, like the distribution of voting power or member count. This field of research lacks a comprehensive analysis of the characteristics of DAO proposals and voting—a shortcoming that this study aims to remedy.

Platforms Facilitating DAO Voting

Several platforms, including Aragon, Colony, Snapshot, and DAOstack (Liu et al., 2021; Wang et al., 2022), have been recognized in the literature for their DAO-supporting infrastructure. These platforms enable decentralized decision-making by providing tools for proposal submission and voting, which are essential for the governance of DAOs. Most of these platforms work with off-chain voting methods: Off-chain signatures are often used to

adjust the weights of on-chain tokens, reducing the on-chain load (Wang et al., 2022). These platforms make it easier for DAO participants to vote without paying gas fees.

Snapshot.org, which takes its name from the off-chain voting component of taking a snapshot, is one such popular platform. Snapshot.org, which serves over 73,000 DAOs in total, is an off-chain multigovernance platform whose results are easy to verify (Snapshot, 2024a). Three key elements are involved in the voting process on Snapshot.org: spaces, proposals, and votes. Every space is assigned a category, for example, protocol, social, investment, and more. Proposals and votes are associated with a space, while each space is a DAO. Users can create proposals for a space and vote on them (Snapshot, 2024c). Wang et al. (2022) divided Snapshot.org participants into three kinds of participants:

- **DAO creator:** These are companies or projects that want to use Snapshot.org to create DAOs.
- **Poll proposer:** A poll proposer creates the proposal for a specific project. Some DAOs require a proposer to hold a sufficient number of tokens.
- **Users:** Users can vote for each proposal based on their preferences. Users must have a wallet address with the assets used for the vote.

In conclusion, platforms like Snapshot.org will play an important role in the future of DAO governance. The structure of such platforms, which consists of spaces, proposals, and votes, provides a robust framework for analyzing proposal characteristics and their impact on decentralized governance.

Decision-Making in DAOs

Decision-making is an important governance factor in DAOs. This section explores theoretical insights into voting behavior, decision-making processes within DAOs, and the factors that might influence voting outcomes in DAOs. By exploring these elements, this section aims to provide a comprehensive understanding of how DAOs operate and how decisions are made.

Theoretical Insights into Decision-Making

The literature on decision-making offers several frameworks for understanding voting behavior. In his book *Personality Psychology, Ideology, and Voting Behavior: Beyond the Ballot,* Cotterill (2023) offers a psychological perspective: He uses the five-factor model of personality and people's ideologies to explain the way people vote. Many life outcomes are best predicted by combinations of personality traits, suggesting that individual differences play a significant role in how people vote. Cotterill (2023) also described the concept of "ideological possession," a term coined by Carl Jung. "Ideological possession" occurs when extreme identification with an ideology leads to a loss of objectivity and a cult-like mentality that sees opposing views as fundamentally wrong or evil. This phenomenon is of great relevance in the context of blockchain and Bitcoin, where powerful ideologies often align with right-libertarian values (Golumbia, 2015). Cotterill's work is particularly relevant in the context of DAOs, where ideological commitment to decentralization and blockchain technology may influence decision-making.

In the book *How Voters Decide*, Lau and Redlawsk (2006) explore multiple decision-making methods and external factors that might influence the decisions. Lau and Redlawsk's (2006) methods are outlined in Table 2.

Table 2: *Decision-Making Methods*

Method	**Meaning**
Rational Choice	The most cognitively taxing decision strategy, even though it yields a value-maximizing result
Confirmatory Decision Making	Decision makers are motivated to learn as soon as possible.
Fast and Frugal Decision Making	Most likely to be used when decision makers are under intense time pressure or when the decision is exceptionally tough.
Semiautomatic Intuitive Decision Making	This strategy should increase in response to any factor that causes decision makers to be primarily motivated by the desire to make an easy decision, especially when task difficulty increases.

The above strategies outlined by Lau and Redlawsk provide a framework for analyzing voting behavior in DAOs. For example, given the often-rapid pace of decision-making in DAOs, the fast and frugal model may be particularly relevant.

Herbert A. Simons decision-making theory further elaborates on the process of decision-making, introducing the concepts of bounded rationality and heuristics. Simon (1979) breaks down the decision-making process into three stages:

1. **Intelligence activity stage**: At this stage, individuals identify issues within the company, and senior management analyzes the organizational environment in an effort to find a solution.

2. **Design activity stage**: Here, upper management looks for suitable strategies to address the problems identified. They analyze the merits and demerits of various options to select a particular course of action.
3. **Choice activity stage**: This stage involves critically examining and evaluating the consequences of all the alternatives that have been listed to select the most suitable course of action. Creativity, judgment, and quantitative analysis skills are needed for this stage.

The above theoretical insights from Cotterill, Lau, and Simon offer a framework for analyzing voting behavior and decision-making in DAOs. By considering personality traits, ideologies, and cognitive strategies, this study can better analyze proposal outcomes. While these theoretical insights provide a valuable starting point for understanding decision-making in DAOs, there is a clear need for further research that addresses the unique characteristics of decentralized governance.

Decision-Making in DAOs

Because of its decentralized nature, the decision-making process in DAOs differs from the process in traditional organizations. This section examines the ways in which decisions are made within DAOs and what factors might influence these decisions.

DAOs provide a decentralized governance solution through blockchain, where the decision-making process relies on on-chain and/or off-chain voting and follows the majority rule (Sun et al., 2022). According to Jha (2023), DAOs offer several advantages over traditional centralized decision-making, including decentralization of power, global participation, trust and transparency, efficiency and speed, and cost-effectiveness. However, Jha (2023) also noticed challenges to effective decision-making in DAOs. These challenges include the following:

1. Participation issues in DAOs
2. Governance voting mechanisms and token distribution
3. Communication and community engagement in DAOs
4. Regulatory and legal challenges in DAO governance
5. Security and governance risks in DAO
6. Interoperability challenges for DAO

A study by Fan et al. (2024) highlighted that in a decentralized DAO, every DAO voter should be highly independent, such that decision-making does not mandate specific member participation. A study by Laturnus (2023) found that high-performing DAOs are those with an active community. Therefore, the active and meaningful participation of stakeholders is important for the success and effectiveness of decision-making in DAOs.

According to Law (2021), DAOs are already experimenting with different types of voting mechanisms to encourage participation. Participation is often evidenced through a token that is coupled with the smart contract. Fan et al. (2024) highlighted different types of voting mechanisms and compared them in terms of decentralization, security, effectiveness, and efficiency. Holographic consensus proved to be the most decentralized, and weighted voting proved to be the most effective (Appendix A, Figure 1). At present, the voting mechanism used most often is token-based quorum, which scores relatively high on decentralization, security, and effectiveness but low on efficiency.

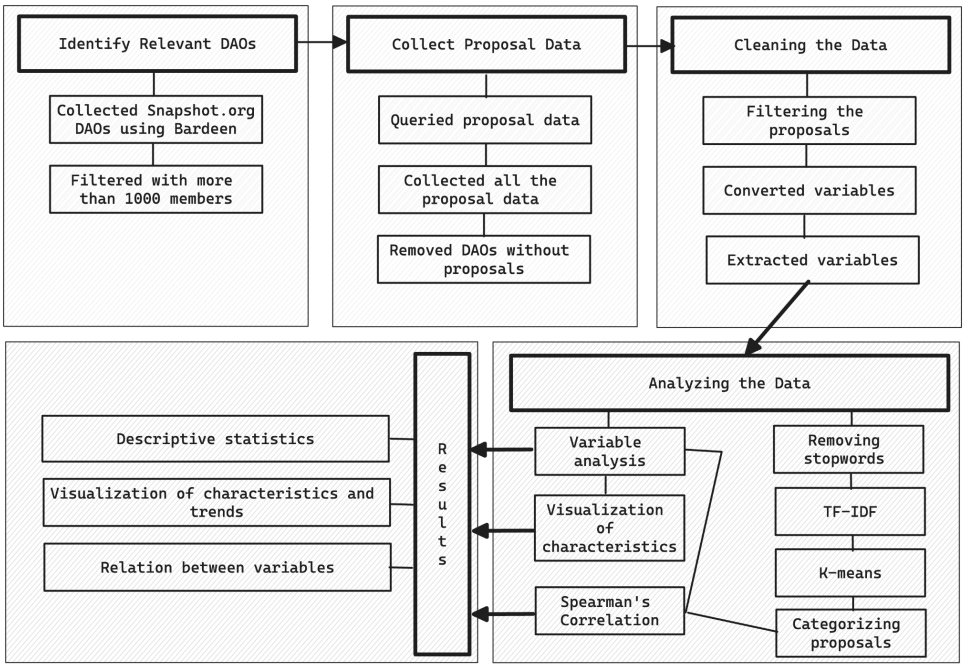
Another challenge highlighted by Jha (2023) is communication and community engagement in DAOs. In a DAO, all members share decision-making authority, and decisions about the future of the DAO will be made by members via voting (Sun et al., 2022). Therefore, group cohesion, which reflects the level of agreement and unity within a coalition, is important for DAO performance (Sun et al., 2022).

In conclusion, decision-making in DAOs represents a paradigm shift away from traditional organizational governance. While DAO decision-making offers advantages in terms of decentralization, transparency, and participation, the process also presents unique challenges. The effectiveness of DAO decision-making processes depends on various factors, including voting mechanisms, community engagement, information dissemination, and incentive structures. As the DAO ecosystem evolves, further research and experimentation will be crucial for the development of best practices for decentralized decision-making.

Method

This study focuses on the impact of proposal characteristics on decentralized governance in DAOs. To answer the research question, a quantitative, cross-sectional, descriptive research approach was adopted. I opted for descriptive research because this approach allows for the portrayal of an accurate profile of events and the description of the characteristics of the variables (Al-Ababneh, 2020). Existing research on the topic of DAOs, particularly in relation to DAO proposals, is insufficient. Therefore, a clear picture of phenomena needs to be drawn, and descriptive research is a frontrunner in exploratory studies (Al-Ababneh, 2020; Saunders et al., 2007). This study aims to add to the body of knowledge on DAOs and their proposal processes by describing the characteristics, trends, and interrelations of proposals, thereby transforming raw data into meaningful information (Saunders et al., 2007). Furthermore, given the increase in the number of DAOs, a comprehensive descriptive analysis can provide a snapshot of current practices and serve as a benchmark for further measurement and exploration. In this section, I discuss my research design and methodology (Fig. 4), which were carefully selected to ensure validity and reliability.

Figure 4: *Research Design DAO Proposals*



Data collection

Identification of Relevant DAOs

Using Bardeen, the names and membership count were collected of all DAOs listed under the "protocol" category on Snapshot.org. Bardeen is an automation platform that offers workflows and data extraction (Bardeen, 2024). The category "protocol" on Snapshot.org was chosen for this research for several compelling reasons. First, protocol DAOs, such as Gitcoin, Linea, SafeDAO, Bancor, and MoonBeam, operate within decentralized finance (DeFi) protocols and rely heavily on community governance. This makes them ideal for studying the impact of proposal composition on decentralized governance. Second, the "protocol" category is the second largest on Snapshot.org (after "social"), indicating a high level of activity and community engagement. The category "social" was not selected because of the high number of social clubs, like bookDAO or golfDAO, in this category. These DAOs are also less relevant to the purposes of this study, because they are focused less on DeFi protocols and more on social activities. By focusing on protocol DAOs, the findings of this study will contribute to an important yet understudied area of the DAO ecosystem.

Bardeen scraped a comprehensive list of 2,531 DAOs from Snapshot.org. The list (Appendix B, Table 1) was filtered to produce a list of DAOs with 1,000 or more members. This filtering process ensured a focus on DAOs that have significant levels of activity, thereby reducing the likelihood of skewed data due to outliers from smaller DAOs. This resulted in a list of 95 DAOs with 1,000 members or more, where a member is an active user who connected his wallet to Snapshot.org and joined the DAO (*What Is a Space? | Snapshot*, 2024).

Extraction of Proposal Data

For each of the 95 DAOs identified, different proposal fields were queried using the Snapshot GraphQL API and Python scripts (Appendix B, Listing 1). This process resulted in a dataset of 5,037 closed proposals, with 13 variables per proposal. Because the goal of this study was to analyze the complete proposal process, the focus was on closed proposals. This focus prevented the introduction of any potential biases by ongoing or incomplete proposals. The Snapshot GraphQL API offered a variety of fields to extract: The fields and descriptions that were extracted for this research are presented in Table 3. DAOs without proposals were excluded from the list, leaving 91 DAOs and their proposals to be analyzed. These fields will contribute to a more holistic understanding of DAO proposals. While most studies focus on only a few fields, this study's approach allows for a multifaceted analysis of how various fields interact and relate within proposals and decentralized governance.

Table 3: *Extracted Fields, Snapshot.org*

Name	***Description***	***Format***
id	*A unique identifier for each entry or snapshot*	*number*
title	*The title of the snapshot*	*text*
body	*The main content or body text of the snapshot*	*text*
choices	*Options or decisions presented within the proposal*	*text*
start	*The start date or time when the proposal became active for voting*	*unix*
end	*The end date or time when the proposal was closed*	*unix*
snapshot	*Snapshot date blockchain*	*Number*
state	*The current status of the proposal, such as "active", "closed", "pending"*	*text*

author	*The creator or originator of the proposal*	*wallet*
scores	*The total votes per choice*	*number*
votes	*The number of votes from users that the proposal has received*	*number*
scores_total	*The total score accumulated by the proposal*	*number*
strategies	*Voting strategies within the proposal*	*JSON*

Data Cleaning

Filtering the Proposals

The first phase of cleaning focused on identifying and removing test proposals. Test proposals are typically used for experimental purposes and do not contribute meaningful data for this analysis. Each proposal in the dataset was checked using a Python script (Appendix B, Listing 2) that checked for test-related words, such as “test,” “demo,” and “test proposal.” After identifying potential test proposals, 68 test proposals were manually removed from the dataset. The second phase involved verifying the language of each proposal title. To maintain consistency, only proposals written in English were retained. English was chosen because it was the primary language in the dataset and the language used most commonly. Each proposal title was analyzed using Python scripts (Appendix B, Listing 3) that checked for non-English. Of all the proposals 11 non-English proposals were identified and manually removed from the dataset. In the third phase, which checked the number of voters for every proposal, 189 proposals with a scoring total of 0 were manually removed as these proposals had not been voted on. This step ensured that only proposals with voter engagement were included.

After the removal of the test proposals, non-English proposals, and proposals without voters, the dataset was final and ready for analysis. The dataset was not checked for outliers with, for example, z-scores or boxplots, because the given outliers in the dataset are true outliers. The dataset was formatted and saved in CSV and XLSX formats for further analysis.

Data Conversion and Extraction

Multiple variables were converted in preparation for the analysis. The start and end data, initially in UNIX format, were converted into dates using a Python script (Appendix B, Listing 4). Using Python scripts (Appendix B, Listing 5), supported networks and supported assets were also extracted for further analysis. Twenty-five proposals used an API for their proposals, and the supported assets were set to 1 manually. Other variables that were extracted based on the initial data were voter option count, proposal duration, winning ratio, word count, and link count using Python scripts (Appendix B, Listing 6). These variables provided more insights into the characteristics of the proposals, which resulted in a more robust analysis.

Data Analysis

The cleaned proposal data was used for quantitative analysis to study the characteristics and impacts of DAO proposals on decentralized governance. The analysis was designed to identify characteristics, patterns, trends, and differences in DAO proposals. Analytical tools, such as SPSS and Python modules Pandas and Scipy, were used to analyze and visualize the trends and patterns efficiently. This data analysis section is divided into two parts: explorative analysis and proposal analysis.

Proposal Characteristics

An explorative analysis of the proposal variables was done to gain an understanding of the characteristics and trends of different DAO proposals. This analysis was particularly valuable because it enabled this study to address the knowledge gaps, identify patterns and trends, find practical implications, and establish benchmarks for further research.

Proposal Count: The first variable that was examined was the proposal count per DAO. This variable provided insight into the activity levels and governance intensity of the DAOs in this study. The number of proposals submitted within a DAO indicates its levels of activity and engagement: A higher number of proposals may indicate a more active and participatory community, whereas fewer proposals may indicate lower engagement or a more centralized decision-making process. The proposal count per DAO also highlights the proposal distribution among the DAOs included in this study. The distribution might skew the results, as some DAOs and their proposals could overrepresent the dataset.

Growth Metrics: To establish a benchmark for further research, the growth metrics of the proposals and supported networks over time were analyzed and visualized using SPSS.

Voting Duration: The voting duration of a proposal directly affects the efficiency of the vote (Fan et al., 2024). Therefore, the outcomes will show a trend in the duration of the voting period and whether DAOs require voters to make decisions quickly, as Fan et al. (2024) stated. To do so, the duration was recoded into eight categories using SPSS visual binning and the binned variable for visualization.

Proposal Length: To understand the complexity and detail involved in each proposal, the length was measured in word count. Longer proposals may indicate more complex and detailed discussions, while shorter proposals might suggest more straightforward decisions.

Additionally, the proposal length might impact the proposal and its effectiveness (Maug & Rydqvist, 2008). Therefore, the word count was counted using a Python script (Appendix B, Listing 6) followed by binning it into 11 categories in SPSS for visualization and analysis.

Cross-referencing: The same analysis that was done for proposal length was done for cross-referencing in the proposal body to count the number of links to external pages. This cross-referencing analysis will highlight the interdependence of decisions and the degree of consultation involved in the governance process.

Supported Networks and Assets: To gain insight into trends and characteristics of the supported networks and assets tied to the proposals, this study analyzed the extracted variables "supported networks" and "supported assets." This was accomplished by binning the variables into categories and using the newly created binned variables for visualization in SPSS. The same process was applied to the variables "voting options" and "voters."

Winning Ratio: Better known as the consensus ratio, the total voting score was compared to the winning outcome to determine the consensus ratio among the proposals using a Python script (Appendix B, Listing 6). Additionally, the data was binned and visualized using SPSS. Because a high winning ratio does not necessarily indicate an optimal decision, the consensus ratio was analyzed for correlations with other influential variables that might have an impact on the consensus ratio of a proposal.

Understanding Proposal Characteristics

Building on the insights provided by the explorative analysis, a detailed analysis was conducted of the proposal variables and their potential interrelations. A wide range of proposal characteristics were analyzed, including proposal category, proposal duration, title keywords, proposal length, voter choices, and voting outcomes. Analyzing such a wide range

of proposal characteristics allows for their interrelationships to be examined and for best practices to be revealed. Such best practices can then provide a foundation for future research on DAO proposals. To identify the types of proposals submitted across different DAOs, each proposal is clustered and categorized based on the proposal title. The goal of this process was to find clusters that share the same or similar inputs (Grus, 2015). The titles were clustered using frequency-inverse document frequency (TF-IDF) and the unsupervised clustering algorithm K-means. First, the titles were preprocessed by removing stop words with the NLTK stopword corpus using a Python script (Appendix B, Listing 7). The script also removed non-alphanumeric characters and multiple spaces from the titles. Second, the TF-IDF and PCA scripts transformed the text data into a numerical format and reduced its dimensionality for better visualization (Q. Wang et al., 2022). Because k for K-means was unknown, the titles were analyzed using Python scripts (Appendix B, Listing 7) to find the optimal number of clusters with K-means using the elbow and silhouette method (Yuan et al., 2022). The goal of the elbow method is to maximize k while keeping overfitting to a minimum (Yuan et al., 2022). This is done by measuring the within-cluster sum of squares (WCSS). The silhouette method helps with finding k by finding the distance between the resulting clusters and how close each point in one cluster is to points in the neighboring clusters (scikit-learn, 2024). A silhouette index score close to 1 indicates a good result; highly disordered clustering results in negative scores; a score close to 0 indicates that the measure has not identified an overall structure (Yuan et al., 2022). Finally, after finding the optimal number of clusters, the preprocessed titles were clustered into categories using a Python script (Appendix B, Listing 8). The categories were named manually, based on their top 20 keywords.

To discover potential relationships between variables, Charles Spearman's nonparametric correlation coefficient method was used. Spearman's correlation coefficient is

essentially a special case of Pearson's correlation coefficient: Spearman's correlation converts the raw data into ranks before doing the calculations (Xiao et al., 2015). Spearman's correlation coefficient makes it easier to deal with outliers. Because of Pearson's assumption that you have no outliers in a normal distribution, it was not possible to use Pearson's correlation. Another difference is that Pearson's correlation focuses on linearity while Spearman's focus is on the monotonicity of relationships.

Quality of Research Design

According to Morse et al. (2002), reliability and validity remain appropriate concepts for attaining rigor in qualitative research. To ensure the rigor and quality of this study, reliability and variability were considered in every aspect of the research design. All the steps of this study are replicable, except for the fact that this is a cross-sectional study and that the data was collected at a particular time. The confirmability of this research should be high, which means that the results could be confirmed or corroborated by other researchers (Roberts & Priest, 2006; Trochim et al., 2015).

The research design selected for this study has the limitation of not cleaning the dataset based on outliers. Outliers have been described as "the head of the beast of bias" (Field & Miles, 2018). However, because this study deals with a large amount of data, the expectation was to find variables with outliers. Outliers, found by using the range and standard deviation, can exaggerate the results of the analysis (Trochim et al., 2015). Even though there were outliers in this dataset, found in variables such as word count or proposal duration, they were not removed because they were true outliers. Because this study is descriptive and does not aim to answer the "why," there is no need for test statistics like the p-value that require a normal distribution. Thus, the nonparametric model from Spearman was used to find correlations between the datasets.

Data Use Disclaimer

All the data used in this study is open-released and free to use. No data is or will be used for any commercial purposes. This study and its quantitative data collection processes are also approved by the Economics and Business Ethics Committee (EBEC).

Results

This section presents the results in the same order as the research steps that were followed. The results are based on the final dataset of 4,769 proposals from 91 unique DAOs. This section is divided into two chapters, starting with a basic analysis. The analysis examines the various variables that were collected, cleaned, and recoded from the raw dataset with the aim of identifying the characteristics of DAO proposals. The second section focuses on the proposal categories and the relationship between the different proposal variables, analyzing their impact on decentralized governance. Table 4 provides a high-level overview of the results.

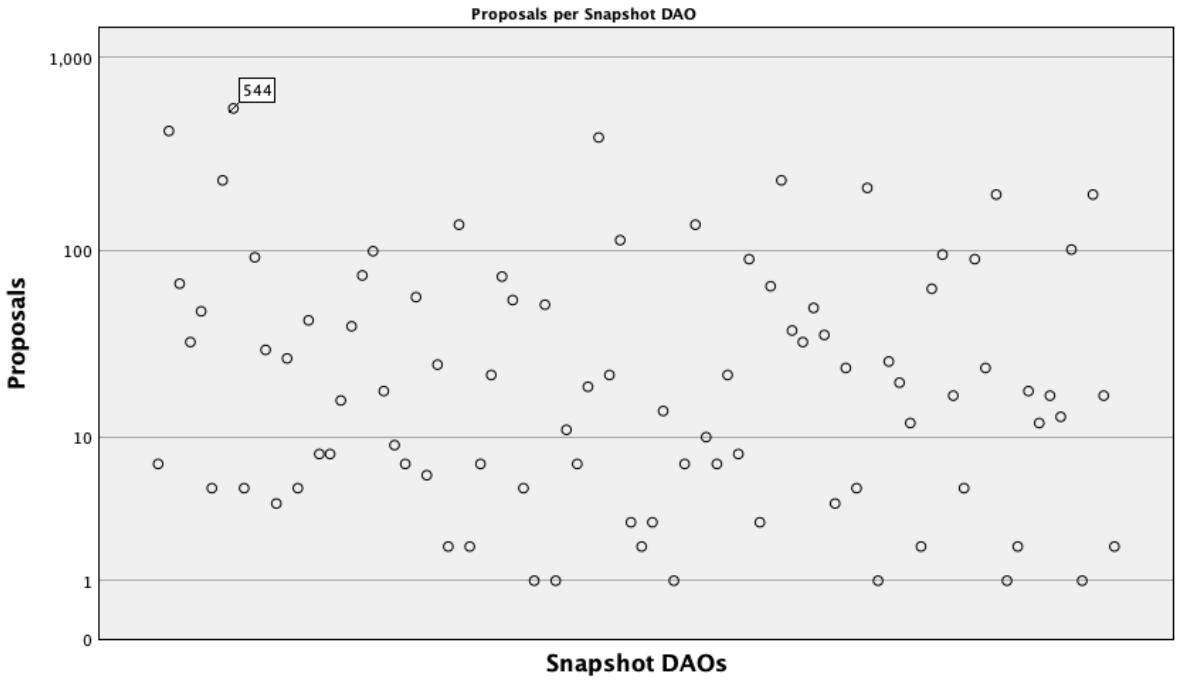
Table 4: *Result Guidance*

Index	***Description***
Fig. 5	*Proposals per Snapshot Protocol DAO > 1,000 members*
Fig. 6a	*The number of voters every quarter*
Fig. 6b	*Supported networks within proposals per quarter*
Fig. 7a	*Proposal duration*
Fig. 7b	*Voting options per proposal*
Fig. 7c	*Voters per proposal*
Fig. 7d	*Supported assets per proposal*
Fig. 7e	*Supported networks per proposal*
Fig. 8a	*Word count per proposal*
Fig. 8b	*Link count per proposal*
Fig. 9	*Winning ratio among proposals*
Fig. 10	*Clustering the proposals*
Table 8	*Spearman's correlation matrix*

Proposal Characteristics

This section describes the proposals in terms of their duration, voting options, voters, supported assets, supported networks, and other variables. Fig. 5 shows the proposal count per DAO studied in this study. The DAO with the most proposals was Bancor, with 544 proposals, followed by Aavegotchi, with 466 proposals (Appendix A, Table 1). The majority (45) of DAOs had between 10 and 100 proposals each since their launch on Snapshot.org. The variation in these proposal counts suggests different levels of decentralization or different approaches to decision-making across different DAOs. In the following section, I will study these differences and analyze their impact on decentralized governance.

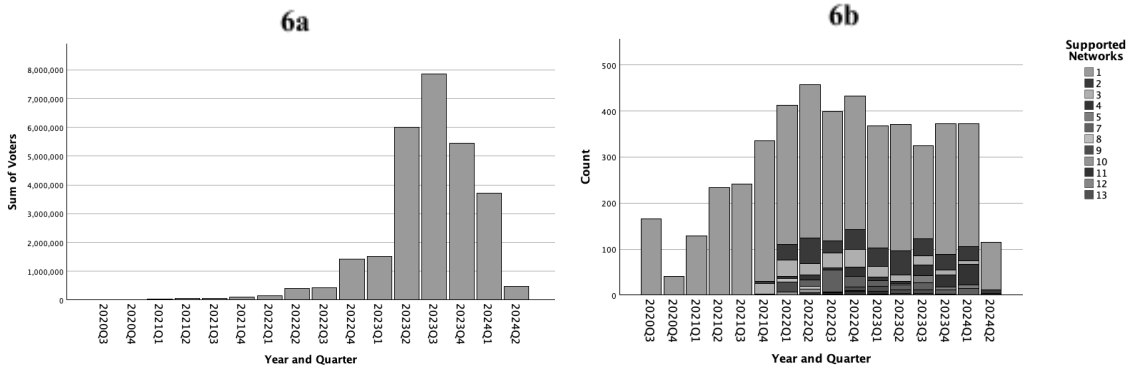
Figure 5: *Proposals per Snapshot Protocol DAO > 1000 members*



Looking at the growth of DAOs and Snapshot.org as a platform over time, it is noteworthy that the platform experienced major growth during the second quarter of 2023. This surge indicates a growing interest in platforms like Snapshot.org and, therefore, in DAOs and decentralized governance. Furthermore, Fig. 6b shows that in the first quarter of 2022, DAOs on Snapshot.org started to adopt the support of multiple networks for their

voting strategies within proposals. Support for multiple networks increases the accessibility of DAOs. Therefore, this shift towards multichain likely contributed to the surge in Q2 2023 as DAOs began to adopt multiple networks, making decentralized governance more accessible.

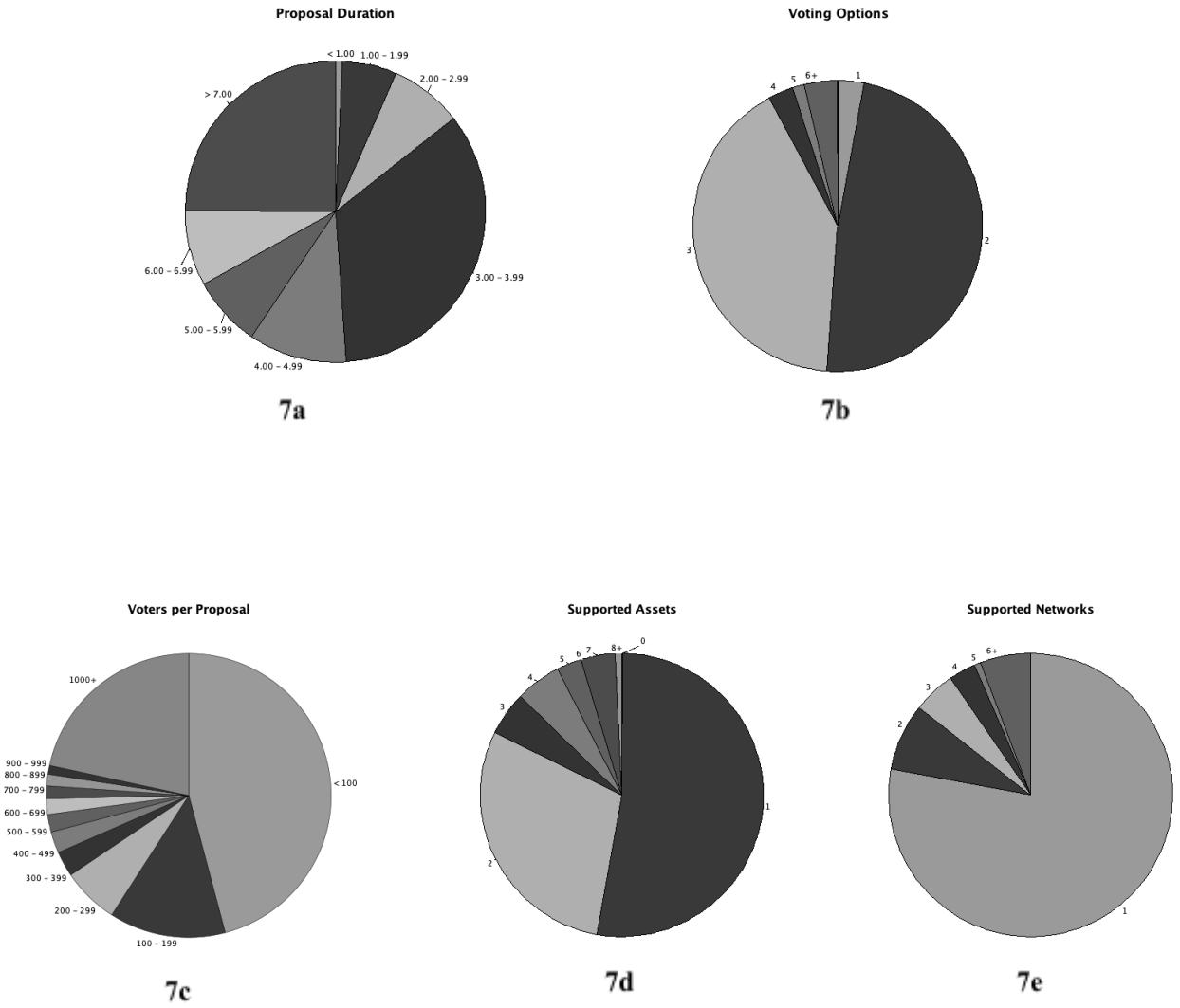
Figure 6: *Growth numbers Snapshot.org*



Proposal Duration: Fig. 7a shows that most proposals (1,644) have a voting duration of three days, and more than 75% of the proposals have a voting duration of less than seven days (Appendix C, Figure 1). This finding shows a strong preference for short decision-making periods in DAOs, indicating a clear prioritization of efficient governance processes.

Voting Options: Regarding the voting options in Fig. 7b, 2,302 proposals offered only two options, in most cases, “Yes” or “No,” or any form that matches one of those two options. Another 1,954 proposals included three voting options, which in most cases were “Yes,” “No,” or “Abstain.” This preference for straightforward voting options suggests that DAOs prioritize efficiency, clarity, and ease of participation in their governance processes. The inclusion of an "Abstain" option in many three-choice proposals indicates a recognition of the importance of allowing neutral stances.

Figure 7: Visualizations of Proposal Characteristics



Voters per Proposal: The number of voters per proposal shows that most proposals had either more than 1,000 or fewer than 100 voters. Note that it was not possible in this study to determine if the voters are unique people; therefore, wallets are used as a proxy for individual users. Proposals attracting more than 1,000 unique wallets likely address issues of broader interest or higher impact within the DAO, whereas proposals with fewer than 100 unique wallets might be perceived as less critical or relevant.

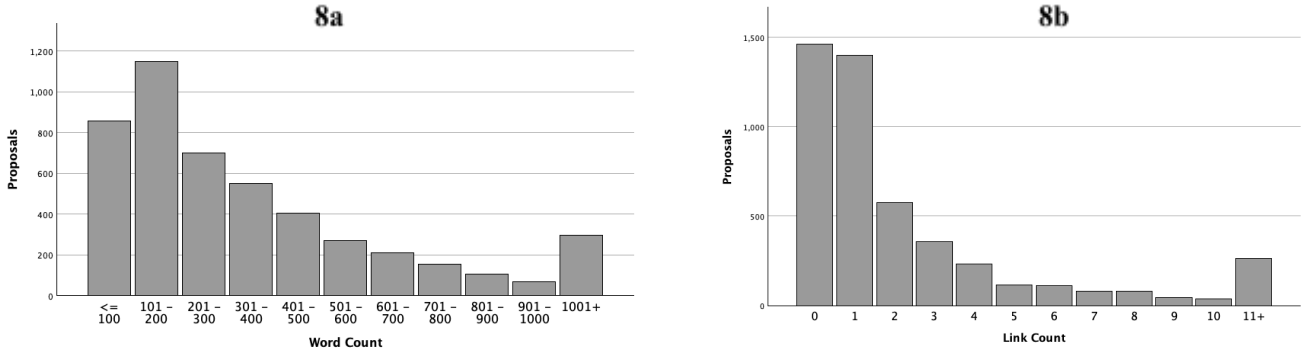
Supported Assets: Of the 4,769 proposals, 2,502 support only one asset for voting, which in most cases is the DAO's native token, or NFT. Some DAOs offer more than one

option, for example, in the case of multichain options, wrapped tokens, liquidity pools, and NFTs. Note that 35 proposals have no options. This is because these proposals used an API, making it impossible to find the supported assets within the data. More than half (52.46%) of the proposals rely on a single asset, which could skew decisions if larger stakeholders dominate the vote. However, the other half of the proposals that support more than one asset allow broader participation from members holding different assets. The nearly even split between single-asset and multi-asset proposals suggests that DAOs are balancing between simplicity in governance and inclusivity of diverse stakeholders. This trend indicates an developing approach to DAO governance, with many DAOs recognizing the need to accommodate a wider range of participants while others maintain a more concentrated decision-making structure.

Supported Networks: According to Fig. 7e, Ethereum is the most popular blockchain used by the DAO proposals in the dataset, accounting for a fraction of 61.5%. Polygon PoS comes in second at 25.35%, followed by Arbitrum One (17.32%), Binance Smart Chain (13.67%), Fantom Opera (12.58%), and Optimism (1.4%). Note that proposals do allow the support of multiple blockchains.

The dominance of Ethereum highlights its position and reliability within the blockchain community, especially for DAOs. The significant presence of Layer 2 solutions indicates a trend towards addressing Ethereum's known limitations. Moreover, the fact that percentages sum to over 100% implies that DAOs are adopting a multichain strategy, recognizing the benefits of interoperability and diversification.

Figure 8: *Visualization of Word Count and Link Count*



Proposal Length: The length of each proposal, binned into categories and presented in Fig. 8a, shows that most proposals tend to be concise, with the highest frequency observed in the range of 101–200 words. After this range, there is a decreasing trend as the word count increases. On average, a proposal has 364 words (Appendix D, Table 1). Of all the proposals, 55.74% remain in the 0-300 range, and 76.72% remain within 500 words.

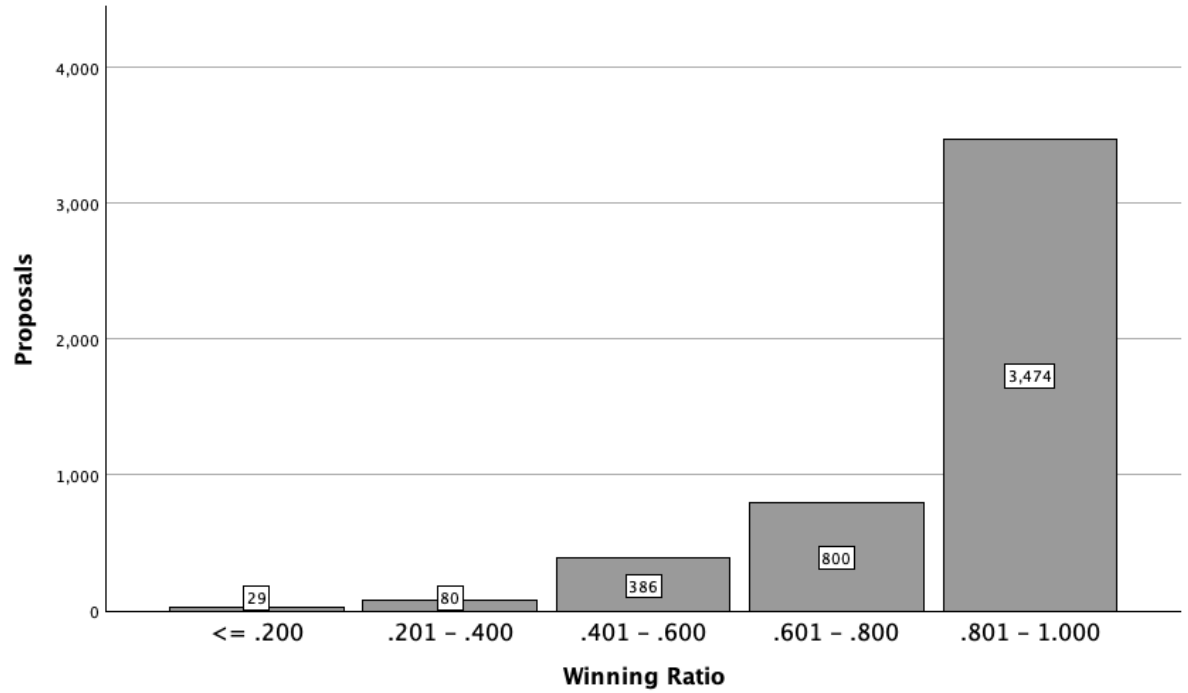
This distribution suggests that DAOs prioritize accessibility and quick comprehension in their decision-making processes, likely aiming to maintain voter engagement, especially with the preference of shorter voting durations and use of straightforward voting options. This trend towards conciseness in DAO proposals reflects an approach to governance that values efficiency and broad participation, potentially balancing the need for thorough information with the goal of encouraging wider engagement. While concise proposals support quick decision-making, they may not provide sufficient depth for complex issues. This could lead to oversimplification of nuanced topics, potentially resulting in suboptimal decisions in DAOs.

Proposal Links: The same analysis was performed for cross-referencing in the proposal body, as shown in Fig. 8b. This cross-referencing analysis shows that most proposals either do not contain any links or have just one link, with 2,863 proposals in total. This trend suggests that many proposals are self-contained or rely on limited external sources. However, it could also limit the depth of information available to voters, potentially affecting decision quality on complex issues.

Winning Ratio: Finally, the voting score was compared against the winning outcome to determine the winning ratio. The results of the winning ratio reveal that most proposals have a high winning ratio, as can be seen in Fig. 9. The number of proposals that had a winning ratio of 80% or higher was 3,474, meaning that more than 80% of the actual voters agreed on the winning option. This high level of agreement indicates strong cohesion among

voters in DAO proposals. Such a trend suggests that DAOs are effectively reaching consensus on most issues, possibly due to obvious proposals, aligned community interests, and/or thorough pre-vote discussions. However, these high winning ratios also raise questions about the nature of decentralized governance in DAOs. While consensus is generally positive, such consistently high agreement could potentially indicate a lack of diverse perspectives or critical debate within the DAO.

Figure 9: *Winning Ratio among Proposals*



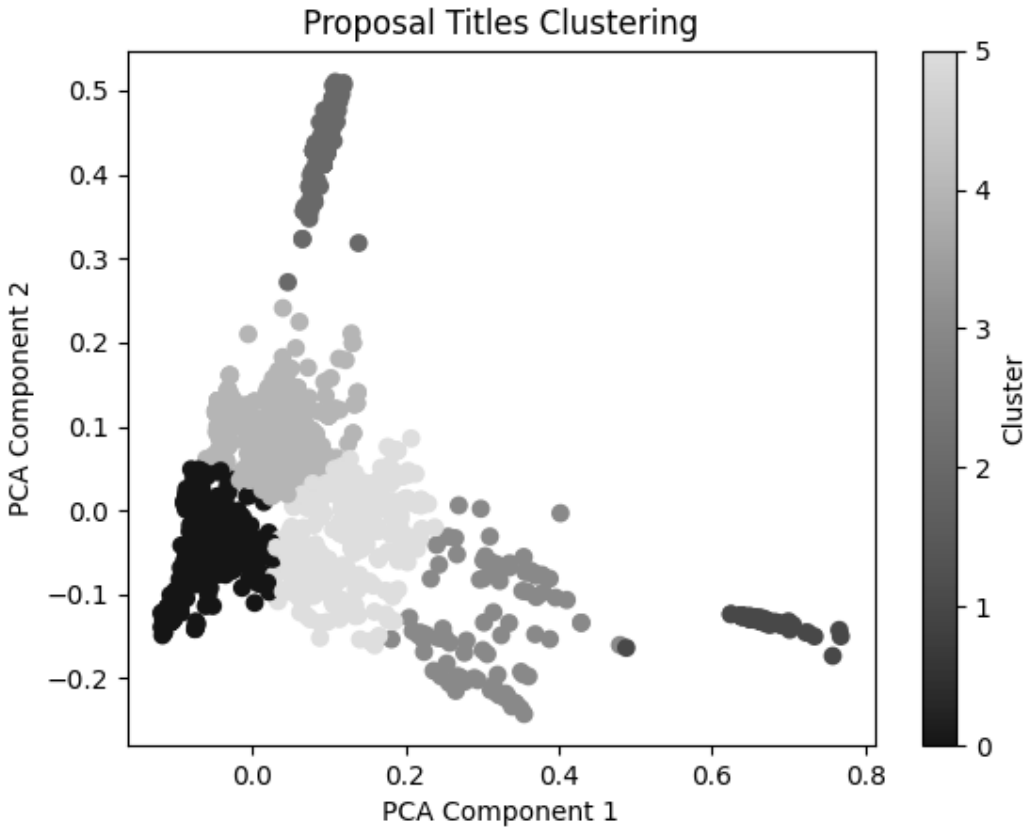
Understanding Proposal Characteristics

This section explores the proposal variables in greater depth, for a more nuanced understanding of DAO proposal characteristics. First, the proposals are categorized based on their titles. This step is followed by a Spearman's correlation matrix that shows the relationship between the variables.

Proposal Categorization

To categorize the proposals, a clustering approach was employed, using the proposal titles. After preprocessing the proposal titles, the clean titles were analyzed for optimal clustering. The elbow and silhouette method was used in this analysis. After comparing the outcomes of the elbow (Appendix C, Figure 2) and silhouette (Appendix C, Figure 3) optimal clustering numbers, six clusters were chosen for K-means clustering. To better understand the distribution and relationships between the different proposal categories, a visualization of the clustering results is presented in Fig. 10 below. This visualization was created using PCA.

Figure 10: *Clustering the Proposals*



Using a Python script (Appendix C, Figure 6), the top 20 keywords (Appendix C, Table 1) for every cluster were collected based on their weight in the TF-IDF analysis. Based on the clusters and their keywords, the following categories were defined:

Category 0: Community Activities (n = 3,345)

This category primarily covers proposal titles that focus on community activities but also on governance proposals and voting mechanisms.

Category 1: Bancor Funding Proposals (n = 85)

This category is focused on Bancor's funding proposals, which include DeFi partnerships, liquidity mining, and staking.

Category 2: Arbitrum Incentives (n = 173)

This category contains Arbitrum incentive proposals, focusing on implementing new products and assets on Arbitrum.

Category 3: Investment and Ecosystem Incentives (n = 98)

This category deals with proposals that cover investments, ecosystem incentives, and reward mechanisms.

Category 4: Funding and Liquidity Management (n = 631)

This category covers proposals that include funding, investment, and liquidity management.

Category 5: Protocol Adjustments (n = 437)

This category is focused on proposals related to whitelisting or adding tokens, adjusting liquidity parameters, and protocol adjustments.

One observation is that the K-means algorithm effectively classified Bancor and Arbititrum proposals into distinct clusters, as can be seen in Fig. 10, with the cluster on top and on the right. The likely cause is that both Bancor and Arbitrum use standardized proposal formats and whitelisted proposal authors. While this approach offers DAOs consistency, efficiency and quality control, it also raises important questions about the nature of decentralizations in DAOs.

Category 0, which covers community activities, is the largest category, with 3,345 proposals. Next, with 631 proposals, is Category 4, which focuses on funding and liquidity

management, and Category 5, which relates to protocol adjustments, with 437 proposals. The majority of the proposals in this study therefore focus on community-related activities, highlighting the importance of community engagement and participation. Simultaneously, it shows the importance of financial decisions in DAOs related to funding, liquidity managements and investments (Category 3, 4 and 5). The distribution of categories underscores the multifaceted nature of DAO governance, aligning decentralization and community ownership, while addressing practical operational needs.

Correlation Analysis

To find potential relations between variables, Spearman's correlation analysis was conducted. Table 8 presents Spearman's correlation matrix. This analysis helps find correlations among the variables and determine if these correlations are consistent with current literature and theories.

Table 8: *Spearman's Correlation Matrix*

Variable	*n*	*m*	SD	1	2	3	4	5	6	7	8	9
1. Category	4,769	1.14	1.860	-								
2. Proposal Duration	4,769	5.364	8.407	-.082**	-							
3. Word Count	4,769	364.08	361.219	.115**	.052**	-						
4. Link Count	4,769	2.69	4.955	.137**	.015	.365**	-					
5. Option Count	4,769	3.01	4.012	.054**	.072**	.024	.081**	-				
6. Supported Networks	4,769	1.71	1.834	-.114**	-.093**	.097**	-.145**	-.006	-			
7. Supported Assets	4,769	1.95	1.513	.052**	.099**	.288**	.140**	-.012	.108**	-		
8. Voters	4,769	5805.43	53395.766	.032*	.263**	.126**	-.016	.165**	.038**	.148**	-	
9. Winning Ratio	4,769	.872	.177	-.137**	-.048**	.005	.012	-.377**	.131**	-.100**	-.253**	-

***. Correlation is significant at the 0.01 level (2-tailed).*

**. Correlation is significant at the 0.05 level (2-tailed).*

The analysis revealed several significant correlations among the variables. Although the correlations are not strong, they can still provide insight into the relationship between variables from the proposals in DAOs. Several of these correlations between variables are outlined below:

1. A significant negative correlation exists between **winning ratio** and **option count** ($r = -0.377$, $p < 0.01$). This suggests that as the number of voting options increases, consensus becomes more difficult to achieve.
2. A significant positive correlation was found between **word count** and **link count** ($r = 0.365$, $p < 0.01$), indicating that longer proposals tend to include more external references.
3. **Supported assets** and **word count** are positively correlated ($r = 0.288$, $p < 0.01$), meaning that proposals with more supported assets tend to have a higher word count.
4. A significant positive correlation exists between **proposal duration** and **voters** ($r = 0.263$, $p < 0.01$), indicating that proposals with longer duration attract greater participation.
5. **Supported Networks** and **Winning Ratio** exhibit a significant negative correlation ($r = -0.253$, $p < 0.01$), implying that proposals supported by more networks tend to have lower winning ratios.
6. **Voters** and **supported networks** show a significant positive correlation ($r = 0.148$, $p < 0.01$), suggesting that proposals supported by more networks tend to attract more voters.
7. A significant negative correlation exists between **winning ratio** and **supported assets** ($r = -0.131$, $p < 0.01$), suggesting that proposals supported by more assets tend to have lower winning ratios.

The correlation analysis shows the complexity of DAO governance, characterized by several trends. The results indicate a trade-off for shorter voting periods and simplified voting options, suggesting that DAOs are constantly balancing the need for efficient decision-making, broad participation and consensus among stakeholders. Notably, the

negative correlation between winning ratio and option count suggests that as proposals offer more voting choices, achieving consensus becomes more difficult. This finding implies that while more options may provide nuanced decision-making, they may also lead to more fragmented voting outcomes, further complicating the balance between comprehensive governance and efficient decision-making.

The positive correlations between word count, link count, and supported assets indicate that more complex proposals tend to provide more comprehensive information, yet this complexity might impact participation rates. The positive correlation between proposal duration and voter count suggests that longer voting periods encourage greater participation, informing potential strategies for increasing engagement in DAO governance.

Another key finding is the impact of growing multichain support. While this increased support correlates with increased participation from voters, it also poses challenges to the achievement of consensus among voters, highlighting the complexities that come with expanding DAO operations across multiple networks. The correlation analysis also shows a tension between participation and consensus. Longer voting periods attract more participants but may make it harder to reach consensus, especially on complex issues with more voting options or supported assets.

In conclusion, these findings highlight the need for DAOs to evolve their governance structures as they grow and face more complex decisions. Developing mechanisms that balance broad participation, efficient decision-making, and thorough deliberation will be crucial. As DAOs mature, their ability to adapt governance models to address these challenges will be key to their long-term sustainability and effectiveness in reshaping organizational structures in the decentralized age.

Discussion

This study started by highlighting the lack of research on DAO proposals and their impact on decentralized governance. By collecting a large dataset of proposals from Snapshot.org, this study aimed to identify the key characteristics of DAO proposals and their impact on decentralized governance. The analysis of 4,769 proposals from 91 “protocol” DAOs on Snapshot.org yielded findings that both confirm and extend our understanding of DAOs and their governance processes. In the performance of this analysis, all the methods and sources were rigorously analyzed and scripted to ensure internal validity. The large dataset from Snapshot.org and in-depth analyses support the external validity of the results.

Proposal Characteristics and Implications

The proposal characteristics highlighted in this study show that DAOs face several trade-offs in their proposal processes, each with their own implications for decentralized governance. This section discusses the findings, trade-offs, and implications of proposal characteristics for decentralized governance.

The results show that DAO proposals tend to be concise, with the majority of proposals (55.74%) containing 300 words or fewer. This conciseness aligns with the need for efficient decision-making in DAOs, as highlighted by Fan et al. (2024). It also reflects the 'fast and frugal' decision-making model proposed by Lau and Redlawsk (2006), which suggests that decision-makers often prioritize efficiency when under time pressure or when the decision is exceptionally tough. However, this characteristic of conciseness raises questions about the depth or comprehensiveness of the information provided to the DAO members.

Interestingly, the positive correlation between word count and link count ($r = 0.365$, $p < 0.01$) suggests that longer proposals tend to provide more external resources. This correlation indicates that more complex proposals often require additional supporting resources. While DAOs generally favor concise proposals, this finding reveals that when more comprehensive information is necessary, proposal authors tend to provide it through external references rather than lengthening the main proposal text. This approach could be seen as an attempt to balance the need for comprehensive information with the preference for conciseness in DAO proposals. It allows proposal authors to provide in-depth information, while maintaining a concise proposal that aligns with the efficient decision-making processes favored by DAOs.

The preference for conciseness in DAO proposals stands in contrast to traditional corporate governance models, where detailed, lengthy proposals are the norm. While this conciseness may facilitate rapid decision-making, a key advantage of DAOs noted by Jha (2023), it potentially comes at the cost of nuanced understanding. As DAOs continue to evolve, they will need to carefully navigate the trade-off between rapid decision and the need for thorough deliberation on complex issues. Future research should explore how DAOs can optimize this balance to enhance the quality of decentralized governance while maintaining the efficiency that sets them apart from traditional organizational structures.

The results also revealed a strong preference for binary voting options in DAO proposals: almost half (48.27%) of all the proposals offered only two choices (typically, “Yes” and “No”). Additionally, 40.97% of the proposals offered three options (often including the choice “Abstain”). Such simplification of voting options, the short duration of the vote, and the conciseness of proposals align with Lau and Redlawsk’s (2006) “fast and frugal” decision-making process. This approach facilitates rapid decision-making and broad

participation in DAOs. However, while this simplification offers clear advantages, it also presents potential challenges for complex decision-making in DAOs.

Despite these advantages, the simplicity, speed, and efficiency of the decision-making process could also impose a limitation on decentralized governance because it reduces the possibility of nuance in the outcomes of complex decisions. Interestingly, the correlation analysis showed a significant negative relationship between the number of voting options and the winning ratio ($r = -0.377$, $p < 0.01$). This finding suggests that if the number of choices increases, finding consensus among DAO members becomes more difficult. In other words, more voting options might result in more nuanced and intelligent decision-making. This aligns with Simon's (1979) choice activity stage, which involves critically examining and evaluating the consequences of all the alternatives that have been listed to select the most suitable course of action.

While the simplicity of binary voting options in DAO proposals offers clear benefits in terms of efficiency and ease of participation, the findings suggest that this approach may come at the cost of nuanced and potentially higher-quality decision-making. As DAOs continue to evolve and tackle complex governance processes, finding ways to incorporate more sophisticated voting mechanisms without sacrificing broad participation will be crucial for the future of decentralized governance.

Another finding in this study is the high consensus ratio across DAO proposals. The results show that 72.8% of proposals had a winning ratio of 80% or higher, indicating strong consensus among voters. These high winning ratios suggest that DAOs are effective at building consensus, even in a decentralized space. This aligns with Sun et al. (2022) observation that group cohesion, reflecting the level of agreement and unity within a

coalition, is important for DAO performance. It also aligns with Fan et al. (2024) observation that proposal approval rates and long voting durations can limit the development of DAOs.

While these high consensus rates appear positive on the surface, they require further analysis. These high winning ratios may reflect the effectiveness of discussion within the DAO communities before the proposal is formally submitted. However, this could also reduce transparency in DAOs if crucial decisions are made in closed environments, contradicting with Faqir et al. (2020) definition of a DAO being an internet-native entity with no central management. Although, the effectiveness of discussions on proposals before submission is not included in this study, future research could examine the nature and impact of pre-submission discussions on proposal outcomes.

Furthermore, the consistently high consensus raises questions about the nature of decentralization in DAOs. While DAOs aim for decentralization, as described by Faqir et al. (2020) as well as Hassan and De Filippi (2021), the consistently high consensus might indicate a more consistent decision-making process than intended. In DAOs, most members share common investments and goals, but they might run the risk of lacking diverse viewpoints, potentially leading to suboptimal decisions. This issue references Cotterill's (2023) warning about the likelihood of groupthink in ideologically aligned communities. It also relates to Golumbia's (2015) observation that groups supporting Bitcoin and blockchain often align with specific ideological values, which could further contribute to homogeneous thinking within DAOs.

Given these considerations, the challenge for DAOs, therefore, is to maintain the benefits of strong community consensus while ensuring sufficient diversity of thought to drive innovation and avoid the pitfalls of groupthink. This balance is crucial for the long-term

sustainability and effectiveness of DAOs as governance structures, as highlighted by Despotović et al. (2023) in their discussion of DAOs' potential to impact society.

The dominance of community-related proposals in the dataset (70.1%) highlights the importance of community engagement in DAO governance. This dominance reflects the decentralized nature of DAOs, as described by Faqir et al. (2020) and Hassan & De Filippi (2021), where decision-making power is distributed among all stakeholders. Additionally, it suggests that DAOs prioritize proposals that encourage participation and engagement, which is crucial for the long-term sustainability of the DAO. While community-related proposals dominate, the governance of DAOs is multifaceted and includes a range of operational and strategic decisions.

The presence of other categories, such as funding, liquidity management, and protocol adjustments, demonstrates the complex nature of decentralized governance. Furthermore, the standardization of proposals observed after clustering in such DAOs as Bancor and Arbirium suggests a shift towards more structured governance processes. Whitelisted proposers, as identified by Wang et al. (2022), are examples of this shift. However, the use of whitelisted proposers raises important questions about the nature of decentralization in DAOs. While potentially improving efficiency and quality control, these practices could conflict with the ideal of fully decentralized and permissionless governance using code to guide-decision making described by Bellavitis et al. (2022). This tension between efficiency and decentralization represents a key challenge for DAOs as they mature and seek to balance effective governance with their foundational principles of decentralization and community ownership.

The growth in multichain support, particularly seen in networks like Polygon POS alongside Ethereum, shows an increasing focus in DAOs on multichain support and

accessibility. This trend strengthens Cengiz (2023) vision of blockchain-based governance constructs competing against core centralized institutions. While multichain support offers increased accessibility, it also introduces new complexities to DAO governance.

The correlation between supported assets and word count ($r = 0.288$, $p < 0.01$) indicates that proposals using multiple assets tend to be longer and more complex. Additionally, proposals supported by multiple networks showed a significant negative correlation with the winning ratio ($r = -0.253$, $p < 0.01$). These findings highlight a crucial challenge for DAOs as they grow across multiple networks: balancing increased accessibility and participation with the need for effective consensus-building. As DAOs grow and face increasingly complex decisions, they need to develop more sophisticated governance mechanisms that can accommodate both efficient decision-making and more nuanced, deliberative processes for complex decisions.

In conclusion, while the current trends in DAO governance towards efficiency and broad participation offer clear benefits, they also present significant challenges in terms of decision quality and diversity of input. As the DAO ecosystem matures, finding innovative ways to balance speed with deliberation, simplicity with nuance, and consensus with diverse perspectives will be crucial for the long-term success and legitimacy of decentralized governance.

Theoretical and Practical implications

The findings of this study contribute to the understanding of DAO governance and proposal characteristics. By showing that DAO proposals tend to be concise, with short voting periods and simplified voting options, businesses and DAO members can make more informed decisions when and when not to implement decentralized governance structures.

Furthermore, the high consensus rates observed suggest a strong alignment within DAOs, but also raise questions about the diversity of perspectives, which organizations should consider when designing their governance processes.

Additionally, the study's insights into the challenges of multichain governance highlight the need for DAOs to carefully balance increased accessibility with the complexities of achieving consensus across multiple networks. This implies that further research and innovation in cross-chain governance mechanisms may be necessary. Given the limited empirical research on DAO proposals and their impact on decentralized governance, this study contributes by filling a significant knowledge gap in the academic literature by answering the research question: "What are the key characteristics of DAO proposals, and how do they impact decentralized governance?"

Therefore, this study contributes to both DAO literature and broader discussions on decentralized governance. It provides valuable benchmarks for DAO processes and offers insights that can guide the development of more effective and sustainable decentralized organizations. By bridging theoretical concepts with practical implications, this research provides DAO stakeholders with crucial knowledge to optimize their governance structures and decision-making processes in this evolving landscape of decentralized autonomous organizations.

Limitations and Future Research

This study focused only on Snapshot.org proposals in the category “protocol,” which may not be representative of all DAOs. Future research could include other categories, DAO types, and DAO platforms. In addition, this study’s quantitative approach could have been complemented with qualitative analysis. For example, expert interviews would have provided

a more nuanced understanding of DAO characteristics and their impact on decentralized governance.

Another limitation of this study is the presence of true outliers in the dataset. These outliers represent actual data points and were not removed to maintain the data as-is. Nevertheless, these outliers might have influenced or skewed the analysis and results. Future studies could focus on analysis without these outliers and use more robust statistical methods to investigate their characteristics.

Furthermore, this study did not focus on the different governance mechanisms (e.g., token-weighted voting, quadratic voting). This decision was taken because of the complexity of collecting those mechanisms from the dataset. Future research could explore how different voting systems impact proposal characteristics and outcomes.

As the DAO ecosystem continues to grow, ongoing research is needed to understand and optimize the system of decentralized governance within DAOs. Future studies can address the limitations identified, identify ways in which DAO governance can become more nuanced and refined, and continue to bridge the gap between theoretical concepts and real-world practices in DAOs.

Conclusion

This study of 4,769 proposals from 91 protocol DAOs on Snapshot.org offers valuable insights into the characteristics of DAO proposals and their impact on decentralized governance. The findings suggest that DAO governance prioritizes efficiency and community engagement, which is reflected in concise proposals, short voting durations, and simplified voting options. While this approach might facilitate rapid decision-making, it also raises the question of whether DAOs oversimplify complex issues.

The high consensus rate across the proposals indicate that DAO communities are aligned, but it also raises the question of whether DAOs have sufficient diversity of thought. The dominance of community-related proposals highlights the central role of member engagement in DAO governance. As DAOs continue to grow, they need to find a balance between quick decisions and careful thought, and between simple choices and complex issues.

Many DAOs are adapting support for multiple networks, and some are also using standardized formats for proposals. While this might help with practical issues, it also raises the question of keeping DAOs truly decentralized and permissionless.

This study contributes to both practical applications and theoretical understanding in the field of DAOs. The study provides a methodological framework for analyzing proposal characteristics that could be applied to other platforms and governance systems. The insights gained could inform best practices for the formulation of DAO proposals and voting processes, potentially leading to better decentralized decision-making.

As the DAO ecosystem continues to grow, future research is needed to understand and optimize decentralized governance practices. Future studies could explore the impact of proposal characteristics and their trade-offs on long-term DAO success, the role of discussions before on-chain decisions, and the effects of different voting mechanisms on

proposal outcomes. Research into these dynamics is needed to help DAOs navigate the challenges of scalable, decentralized governance while staying true to their principles of decentralized, collective decision-making and community ownership.

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