A Master Thesis

Exploring the Potential of Decentralized Autonomous Organizations for Facilitating Trustless Governance and Ownership

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Abstract

This thesis examines how blockchain-based decentralized autonomous organizations (DAOs) can be used to govern an industry-wide blockchain solution through the establishment of trustless governance and ownership. Industries are exploring new technologies such as blockchain in an endeavor to meet requirements for transparency and traceability of their business from consumers and legislators; however, the exploration is complex to navigate. The fashion- and textile industry is one of those industries that harbor great aspirations for blockchain. The inherent complexity of blockchain and the industry itself has encouraged it to turn to industry-wide solutions. However, this entails unseen collaboration among industry actors adding to the complexity of an already challenging task. The blockchain-based DAO is a promising contender to this challenge, providing new means of decentralized and transparent governance.

Currently, there is a scarcity of literature available, and the novelty of the subject leaves few practical experiences to draw from. We address this gap by incorporating established theories and empirical data from industry actors and subject matter experts, using a design science research methodology to construct an industry-DAO core design framework. Our framework comprises seven design categories imperative for an industry-DAO. The fashion- and textile industry can leverage these design categories to establish trustless governance and ownership of an industry-wide solution. While these design categories are not exhaustive, we assert that they serve as an excellent basis for the industry to build upon. More so, we speculate that an industry-DAO is not limited to a single blockchain solution but is a promising catalyst for a collaborative Web3 ecosystem.

Keywords*: Decentralized autonomous organizations (DAOs), blockchain, governance, fashion- and textile, decentralized ownership, industry-DAO, enterprise blockchain, industry blockchain.*

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1. Introduction

The topic of sustainability gains traction in companies as consumer demands and legislator requirements evolve, leading to a shift in the business landscape. Industries with significant adverse environmental impacts must reinvent themselves to stay relevant. The fashion- and textile industry is one of the industries facing these changes due to its reputation as one of the most polluting industries, polluting more than all international flights and maritime shipping combined (UNEP 2018). The industry's adverse impacts consist of human rights violations, particularly in the form of poor working conditions and the use of chemicals.

The European Commission launched a new strategy for *sustainable and circular textiles* under their new *Circular Economy Action Plan* (European Commission, 2022). This new strategy prioritizes the environment and mandates stricter regulations for retail brands that operate in European markets. Consequently, the fashion industry faces two critical challenges, 1) sustainability of their products and 2) transparency, traceability, and ethics of sourcing and producing goods.

Blockchain is a promising technology that has emerged within the last decade, proposed by many to solve transparency and traceability issues. Without the need for a trusted third party, blockchain offers a way to exchange information digitally that is practically impossible to alter. This makes blockchain valuable in enterprise contexts, and many large enterprises have started adopting blockchain in their technology portfolio. However, what is mainly seen in enterprise solutions is a retrofit of old business practices applied to a new generation of technology. This, in particular, is seen with the proprietary and siloed nature of many of the larger enterprise implementations of blockchain, which results in interoperability issues, slower and more costly operations, and issues of governance and ownership. The creation of proprietary blockchain solutions is especially an issue considering how the value of blockchain is inherently dependent on the participation on multiple participants.

If enterprises or industries wish to capture the value proposed by blockchain, a way of designing a shared blockchain solution has to be defined. However, the act of making competitors and untrusted actors come together and collaborate on a shared solution imposes immense and crucial ownership and governance design decisions. These vast challenges are speculated as one of the reasons why the large scaled industry-wide enterprise blockchain solution, TradeLens by Mærsk and IBM, was shut down in late 2022.

Therefore, this thesis aims to assist the fashion- and textile industry in their journey toward a shared industry-wide solution blockchain solution by exploring the design of governance and ownership mechanisms required for such a solution to flourish.

1.1 Research objective

Based on the above introduction and motivation for the research, we seek to answer our thesis's main research and sub-questions:

How should an industry-wide blockchain solution in the fashion- and textile industry be governed*?*

- What potential does blockchain technology pose in the fashion- and textile industry?
- What can we learn from current enterprise blockchain applications?
- What is a Decentralized Autonomous Organization, and how does it compare to cooperativism?
- How can DAOs be used to govern an industry-wide blockchain solution?

1.2 Delimitation

This thesis has intentionally limited its scope to focus on the most significant aspects of governance in the blockchain context, but the topics that were not covered are important to be addressed. Therefore, while undoubtedly important, we do not discuss the legal or regulatory aspects of a DAO or the potential implications of a blockchain solution.

Moreover, we do not scrutinize or elaborate on the underlying technical details of blockchain and its potential technical limitations, e.g., transaction speeds and security, nor do we investigate theoretical models related to supply chain management. However, we examine these aspects, especially blockchain, to the extent of enabling a fulfilling blockchain recommendation and understanding of DAOs. Lastly, our thesis does not cover areas such as change management, organizational change, culture, and technology adoption domains. We will briefly cover small nuances of actual implementation aspects, but the extent covered in this thesis is not meant to be an a-z implementation guide and should therefore be considered before embarking on such an endeavor.

2. Literature Review

This chapter provides context and theoretical groundwork for the research questions of this thesis. Our main- and sub-research questions guide the chapter and therefore seek to understand the academic literature related to those. Consequently, we thoroughly explore arguments in the literature for the potential of blockchain technology in the fashion- and textile industry (FTI). Secondly, we then review some of the most significant enterprise blockchain applications mentioned in the literature and possible learnings that may stem from those. We explore blockchain-based decentralized autonomous organizations (DAOs) and their utility as a contemporary form of governance. Lastly, we examine the cooperativism phenomenon and how it relates to DAOs. First, however, is an explanation of our search strategy.

2.1 Search strategy

To carry out our literature review, we defined an organized search strategy consisting of key concepts of our research questions to obtain as accurate and valuable results as possible. An overview of our approach is expressed as a PRISMA diagram, as seen in Figure 1. We defined six concepts to include in our search strings: DAO, Fashion, Governance, Coops, Platform, and Blockchain. Based on these concepts, we created search strings that, among others, accounted for truncated words, relevant phrases, and different variations relevant to the concepts. Likewise, we tested the search strings in various databases to see how the results matched our ambition and iteratively refined the search queries based on the reviewed search results.

We conducted our search on the following three databases: Scopus, IEEE Xplore, and Google Scholar. We used Scopus and IEEE Xplore as our primary search databases. IEEE Xplore is a digital research database providing access to the world's highest-quality technical literature in computer science, electronics, and other fields (CBS, 2022; Gusenbauer & Haddaway, 2020). Therefore, we considered this database relevant for exploring the technical characteristics of blockchain, DAOs, and related applications to the FTI. On the other hand, Scopus is the world's largest multidisciplinary abstract and citation database of more than 70 million sources. It is considered highly efficient as a curated catalog of information (Gusenbauer & Haddaway, 2020) and useful in exploring technical and non-technical sources. Lastly, Google Scholar was used as a supplementary database as it is a suitable multidisciplinary source that includes grey literature, i.e., non-published- and peer-reviewed literature (e.g., blog posts, whitepapers, websites) (Gusenbauer & Haddaway, 2020). We decided to specifically target grey literature as we noticed that there exist excellent sources on blockchain, DAOs, and their role in FTI (e.g., blog posts, charter documents, and whitepapers on DAOs). That said, throughout the process, we prioritized peer-reviewed sources in our selection as a weight factor to ensure the highest quality.

We queried our search strings to search within abstract on IEEE Xplore, title and abstract on Scopus, and lastly, title on Google Scholar. The reasoning behind this is that our searches, e.g., full text, would result in an enormous number of results, many of which we found irrelevant to our purpose. For instance, the term "DAO" also refers to Taoism or Daoism, a popular Chinese religion commonly using "Dao" to describe a way of living. Furthermore, we made use of Boolean operators in our search strings, such as "AND" and "OR" to ensure we caught all variations on the word, e.g., "Cooperativism" and "Cooperatives". Likewise, using Boolean operators, we could narrow the results to include specific keywords in conjunction with each other and thus filter out irrelevant results. See Appendix A for a complete overview of our search strings.

The last component of our strategy was using the snowball sampling technique (Wohlin, 2014). Doing so meant that we also adopted sources referenced in those sources we found from our database search. We iterated on this procedure if we found references that we deemed relevant. However, we did not do this systematically for all articles but rather ad-hoc in specific cases to identify key sources we did not find through our database query approach.

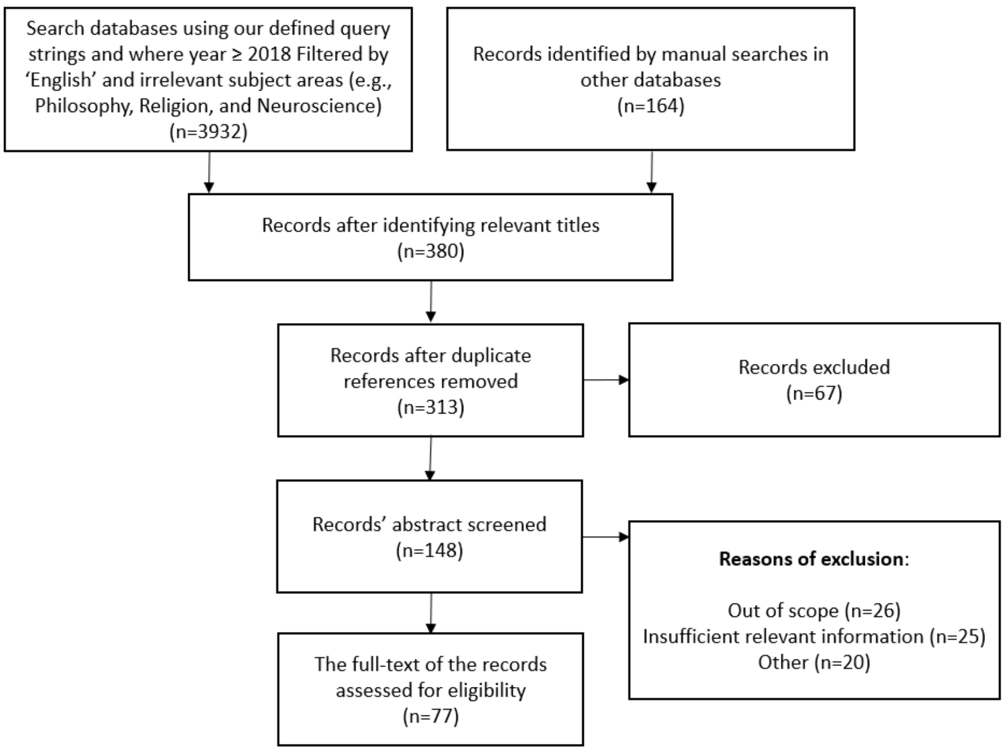

Figure 1 - Literature Search Strategy (PRISMA)

2.2 The potential of blockchain technology in the fashion- and textile industry

By examining 25 sources related to blockchain usage in FTI, three common issues emerged (1) Supply Chain Issues, (2) Sustainability Issues, and (3) Intellectual Property Right Issues. Tripathi et al. (2021) claim that utilizing digital technologies, and especially blockchain technology, may solve many critical issues in FTI. Table 1 highlights a list of authors identified within the three issue types.

Table 1 - Overview of Identified Issues and Scholars

Issue type	Authors
Supply Chain	(Agrawal et al., 2018, 2021; Badhwar et al., 2023; BlockchainBusiness, 2023; Bullón Pérez et al., 2020; Chang & Chen, 2020; ElMessiry & ElMessiry, 2018; Hader et al., 2022; Kouhizadeh et al., 2021; Moretto & Macchion, 2022; Nirantar et al., 2022; Noonan & Doran, 2021; Ribeiro & Brito, 2022; Saberi et al., 2019; TFL, 2018; Tripathi et al., 2021; B. Wang et al., 2020)
Sustainability	(Alves et al., 2022; Caldarelli et al., 2021; Fu et al., 2018; Park & Li, 2021; Remme et al., 2022; Saberi et al., 2019; Tripathi et al., 2021; Venkatesh et al., 2020; B. Wang et al., 2020)
Authenticity of Products	(Agrawal et al., 2018; Badhwar et al., 2023; Malaurie-Vignal, 2020; Noonan & Doran, 2021; Yanisky-Ravid & Monroy, 2022)

2.2.1 Supply Chain

TFL (2018) and Badhwar et al. (2023) state that supply chain implementations are the areas with the most promising potential within FTI. Numerous scholars have looked at blockchain's potential impact on supply chains, including Chang & Chen (2020), that conducted a systematic literature review of 106 articles to provide an overview of the use of blockchain and smart contracts in supply chain management. Chang & Chen (2020) show the proliferation of research in the area over the past three years and how a growing number of publications in different industries explore the application of blockchain and its potential for improved traceability.

The increased timeliness of information transmission amongst entities was captured by enterprises by "[…] reducing the costs of information-related searching, bargaining, and policing" (Chang & Chen, 2020, pp. 13). Furthermore, the authors argue that smart contracts facilitate process automation and provide better real-time monitoring combined with emerging technologies like the Internet of Things (IoT).

Consequently, it may create additional value in supply chains where trust amongst the actors is low (Chang & Chen, 2020).

While supply chains are notorious for being complex, Moretto & Macchion (2022) argue that the complexity is increasing due to, e.g., globalization, international regulations, and different parts of the supply chain often changing. Agrawal et al. (2018) likewise state that it is harder to keep track of suppliers, sub-suppliers, and manufacturers because of the multi-tiered supply chains often seen in FTI. This claim is further elaborated by Noonan & Doran (2021), stating that the supply chain in the fashion industry is a complex and opaque network with an assortment of processes and people both domestically and globally.

In the systematic review of 157 papers, Badhwar et al. (2023) describe the fashion industry as having two distinct types of supply chains, (1) the high-end luxury market and (2) the mass-produced apparel and retail industry (also defined as "fast-fashion" in other papers). Badhwar et al. (2023) state that:

> In most cases, luxury brands control the design and quality of their products by owning the entire supply chain or opting for the most reliable manufacturer and brands mass-producing apparel commonly do not have ownership of their supply chains, resulting in limited control and increased complexity, compared to the luxury brands in the fashion and textile industry (p. 09).

A common theme in blockchain supply chain literature is that the supply chain is limited and defined to start at the sourcing and end at the first consumer sale (Agrawal et al., 2018, 2021; Badhwar et al., 2023; Bullón Pérez et al., 2020; ElMessiry & ElMessiry, 2018; Hader et al., 2022; Noonan & Doran, 2021; Saberi et al., 2019; Tripathi et al., 2021). However, recent literature also documents the possibility of tracking the supply chain further than the traditional view of a supply chain. However, these papers are not as common. Wang et al. (2020), in their proposed system architecture, suggest how blockchain technology could be used as a tool to include the extension of the traditional supply chain in FTI to capture what happens to the items after the initial consumer sale.

Most literature mentions the word *traceability* in conjunction with blockchain supply chain management, where traceability is defined as the ability to identify and trace product-related information (Agrawal et al., 2018). While recent research highlights the distinct lack of traceability in the sector (Badhwar et al., 2023), the topic is growing in interest (Chang & Chen, 2020). However, within FTI, it is still in its theoretical or early practical stage (Agrawal et al., 2018; Badhwar et al., 2023; Bullón Pérez et al., 2020; Moretto & Macchion, 2022; Nirantar et al., 2022). Nevertheless, the conclusions still seem unanimous. Moretto & Macchion (2022) states that blockchain is ideal for companies with a high need for traceability and that the investment requirements are too big for those who do not have a high need for traceability. Moreover, with FTI in the limelight for unsustainable practices (Agrawal et al., 2018), heavily fragmented supply chains (Bullón Pérez et al., 2020), and governmental intervention (BlockchainBusiness, 2023), scholars claim that the industry needs increased traceability (Hader et al., 2022; Tripathi et al., 2021). If it achieves increased traceability, Agrawal et al. (2018) argue that the following areas should see improvement: (1) transparency, (2) Quality Management, (3) Marketing, (4) Logistics Management, and (5) Supply Chain Circularity.

For instance, blockchain technology will enable businesses to understand better their supply chains (Nirantar et al., 2022), facilitate quality control, and ensure that processes are time and cost-efficient (Badhwar et al., 2023). It will also improve customer trust significantly (Ribeiro & Brito, 2022) and provide guarantees in sub-working activities where the products have passed through the supply chain (Moretto & Macchion, 2022). Ultimately blockchain technology shows excellent potential to address the issues in the fashion supply chain by providing greater transparency and traceability (Tripathi et al., 2021) and shows promise as an application for sustainable supply chain management (Kouhizadeh et al., 2021).

Throughout the literature, there was a common consensus of enabling value creation through utilizing blockchain technology in the supply chain. Even though the technology in FTI is still in its early stages, scholars find that traceability and transparency could create value for companies in the industry.

2.2.2 Sustainability

FTI is notorious as a significant contributor to environmental pollution, not only because of its excessive water consumption and use of toxic chemicals but also due to the increasing levels of textile waste (Alves et al., 2022). Literature states that the industry is dependent on three significant aspects of sustainability, defined by the UN, i.e., (1) the environmental aspect, (2) the social aspect, and (3) the economic aspect (Park & Li, 2021; Remme et al., 2022; Saberi et al., 2019; Tripathi et al., 2021; B. Wang et al., 2020).

The environmental aspect focuses on applying the best practices available to ensure that all production processes are environmental-friendly (Tripathi et al., 2021). In their Enhanced Emission Trading Framework, Fu et al. (2018) argue that a system with sufficient actors will ensure that all recorded information is permanent, transparent, and searchable and therefore provide an immutable audit log for all participants of the supply chain. The framework is furthermore argued to be a reliable approach to reducing carbon emissions for the fashion apparel manufacturing industry (Fu et al., 2018)

Saberi et al. (2019) argue that of the three aspects of sustainability in the industry, the environmental aspect is the easiest to improve because of the possibility of measuring, monitoring, and tracking elements like GHG emissions, water usage, energy consumption, waste generation and the use of toxic and hazardous substances on a blockchain transaction platform.

The social aspect is more challenging to measure (Saberi et al., 2019). However, the attention on global brands focusing on the well-being of the people involved in the supply chain has increased, separately from the environmental sustainability aspect (Venkatesh et al., 2020). Wang et al. (2020) also argue that the social problems related to fast-fashion production stem from the economic aspect of wanting to cut costs. Nevertheless, the goal of the social aspect is to ultimately ensure healthy working conditions for the workers (Tripathi et al., 2021) and ensure business's impact on employees, workers, customers, and even local communities is positive (Park & Li, 2021). Park & Li (2021) argues that because blockchain secures stable and immutable information, it will provide a transparent information system that will prevent the corruption of participants, supported by Saberi et al. (2019) stating that stable and immutable information is one way of building supply chain social sustainability. Authors state that because blockchain generates enhanced confidence in what happens in the supply chain (Caldarelli et al., 2021), blockchain will enable concerns about environmental aspects or safety issues regarding the people involved to be brought to life or inform customer behavior (Remme et al., 2022).

Essentially, blockchain will be able to more effectively manage economic- and environmental (ecological) sustainability, rather than the social sustainability in the supply chain (Saberi et al., 2019)

The economic aspect refers to a condition where fashion is affordable, and an economy may achieve enduring growth without sacrificing social- and environmental sustainability (Park & Li, 2021; Tripathi et al., 2021). Saberi et al. (2019) argue that adopting blockchain technology can reduce business waste in the supply chain by reducing transaction costs and time reduction through disintermediation. Caldarelli et al. (2021) argue that blockchain-enabled quality control of the supply chain will result in a lower percentage of returns and waste amount, making it more economically sustainable.

It is also vital for brands to keep costs down, as highlighted by Remme et al. (2022). The authors found that price was, for the general population, still more important than the sustainability of a product. Ultimately the benefits of the economic aspect of sustainability stem from improving efficiency in all areas of the supply chain and reducing risks and damages to the environment and people involved (B. Wang et al., 2020).

The reviewed literature shows that blockchain may theoretically and practically enable change and improvement in the UN's three sustainability areas. While some of them are harder to measure in direct numbers, others are easier to track and provide concrete numbers for companies to measure the success of the implementation.

2.2.3 Authenticity of Products

Badhwar et al. (2023) highlighted how the distinct lack of transparency and traceability within FTI supply chains hurts the industry's ability to combat counterfeit markets, especially in the high-end luxury market. According to Agrawal et al. (2018), the counterfeit market is responsible for a loss of 9.7% of sales or 26.3 billion euros of revenue per year in the sector, 36,300 direct jobs, and 8.1 billion euros of revenue for the government. Furthermore, Malaurie-Vignal (2020) argues that from a legal outlook, regulatory aspects of intellectual property protection, proof of ownership, and product authenticity could benefit from blockchain technology across the FTI. Yanisky-Ravid & Monroy (2022) further supports this by stating that smart contracts and blockchain have tremendous potential to alleviate the fashion design industry's challenges, namely the lack of sufficient IP protection. However, because no widespread solution is available now, they urge first movers to explore this concept. Noonan & Doran (2021) highlights how product authenticity is a natural extension of transparency, and counterfeit products will cease to exist, e.g., through a unique digital authentication ID assigned to the respective SKU.

According to the literature, the authenticity of products should become easier to manage, secure and protect by utilizing blockchain technology. Blockchain also suggests considerable savings, especially in the luxury markets and for companies owning the entire supply chain.

2.2.4 Blockchain Implementation Aspects

While the literature states that blockchain emerging as a revolutionary technology enables transformations of multiple aspects of the sector and provides several unprecedented advantages, the introduction in the industry will still lead to specific issues and challenges (Tripathi et al., 2021). Agrawal et al. (2018) highlight some of these issues and state that the requirements at all stages of the supply chain of skilled workforces and infrastructure will bring limitations or challenges to implementation. Other issues include high costs, immaturity, human errors, data collection, and technology integration (Agrawal et al., 2018; Tripathi et al., 2021). Saberi et al. (2019) found that that top management support is a critical factor for the successful implementation of any supply chain practices.

Several research gaps were also highlighted throughout the literature, calling for more in-depth research. For instance, Badhwar et al. (2023) call for more empirical evidence for the specific application in FTI, and the existing limited substantial use in the industry has left challenges to be resolved. Saberi et al. (2019) back this, claiming that more research will identify various new business applications.

Consequently, the area of blockchain technology in FTI has yet to materialize fully, which is outlined by TFL (2018), stating that there is currently no particular standard governing blockchain applications or developers. A few companies within the industry have adopted blockchain and employed their developers to create applications for their specific products, supply chain, and suppliers (TFL, 2018). TFL (2018) ultimately claims that an industry-wide standard or platform would make the technology in the fashion industry more effective and lower cost, but it would require a level of cooperation that may not be easy to achieve.

Ultimately, blockchain in FTI suggests blockchain can create value in the supply chain, sustainability, and authenticity of products. That said, the implementation is complex and expensive, and the maturity of the technology requires strong technical capabilities and a willingness to innovate in the industry to utilize it to its full potential. Nevertheless, if companies implement the technology, traceability, sustainability, transparency, and authenticity issues should become easier to deal with, and consumers and legislators can base their decisions on accurate, immutable information.

2.3 Blockchain use cases from the real world

This section seeks to explore some considerable enterprise applications of blockchain technology mentioned by literature and what learnings stem from those. We identified 13 sources that specifically explore some real-world enterprise blockchain applications. We do, however, recognize that the descriptions below are not exhaustive.

In an enterprise blockchain benchmarking study by Rauchs et al. (2019), the authors found that the landscape has significantly progressed since their last study in 2017. Lacity (2022) supports this claim, saying that enterprises' adoption and application of blockchain technology is a slow train but that it is coming. In an empirical analysis of more than 60 live networks, Rauchs et al. (2019) found that the typical lifecycle of an enterprise blockchain network is generally divided into four stages (1) initial exploration, (2) proof-of-concept (PoC), (3) pilot/Trial, and (4) production. Furthermore, the author's analysis shows that 71% of live networks originated from a single entity, while merely 22% were a consortium-led initiative (a collection of entities in cooperation) (Rauchs et al., 2019).

An example of such a joint initiative is the recent failure of TradeLens, which was otherwise considered a centerpiece for enterprise blockchain (Duncan, 2023; Litan, 2022) and one of the world's largest global-trade blockchain networks (Goldsby & Hanisch, 2022). Mærsk and IBM initiated TradeLens, which operated as a private permissioned blockchain based on Hyperledger Fabric, to create an ecosystem that connects various global supply chain actors end to end (Jovanovic et al., 2022). However, Duncan (2023) argues that TradeLens was perceived as a biased Mærsk offering, which in turn affected the network participants' willingness to share sensitive data and provide financial support to TradeLens. Likewise, Rauchs et al. (2019) argue that Tradelens is an example of a founder-led network in which

Mærsk "uses its significant market share and power to achieve a minimal viable ecosystem without needing to form a consortium first "(p. 49). On the other hand, Duncan (2023) also states that TradeLens' ecosystem actors and industry processes were not ready for the disruptive change it implied. Since the downfall is recent, literature has not yet concluded on the reasons for its failure; however, this paper perceives that future research on this would be a significant contribution to understanding the enterprise blockchain landscape.

Lacity & Van Hoek (2021) did a case study on Walmart Canada, one of Canada's top four largest retailers by revenue, and their successful use of a blockchain-based platform named DL Freight to improve interfirm invoice processing. They found that by using DL Freight (based on Hyperledger Fabric), disputed invoices fell from 70 percent to under 2 percent and created additional significant business value not only to Walmart Canada but also to its carriers by, e.g., increasing data transparency and enabling automated real-time invoicing (Lacity & Van Hoek, 2021). Consequently, they claim that blockchain is potentially valuable in any ecosystem where partners must validate transactions (Lacity & Van Hoek, 2021). The authors emphasize considerable governance and design issue considerations as part of Walmart Canada's adoption. For instance, they designed the solution as a private permissioned blockchain in which DL Labs (technology provider of DL Freight) operated the network, but Walmart Canada controls most of the platform oversight (Lacity & Van Hoek, 2021). This specific example corresponds with Rauchs et al. (2019) findings that a dominant entity governs 81% of covered networks and that most networks use trusted third parties (TTPs) to operate and host network nodes.

Moreover, Lacity & Van Hoek (2021) found that DL Freight employed "channels" to ensure data policies across Walmart Canada and its carriers and that data immutability was ensured by disallowing "hard forking" to instead correct intolerable errors by new entries that would maintain a record of the error and the correction (Lacity & Van Hoek, 2021). Based on their study, the authors derive six recommendations for using blockchain for interfirm process innovation: (1) thoroughly assess the business value, (2) decide about reengineering processes, (3) consider the need for a blockchain solution vs. traditional database, (4) evaluate whether to use a configured platform or embark on a custom build, (5) decide where to start, PoC or production pilot, (6) consider whether you should manage the blockchain yourself or buy it as a service. Similarly, many of these characteristics also reflect in a study by Mattke et al. (2019). The authors studied the MediLedger Project and their Product Verification System, a private permissioned blockchain that showcases a successful application of how blockchain may be used in an industry-wide pharmaceutical supply chain to prevent counterfeit pharmaceuticals.

In the agri-food industry, Kramer et al. (2021) investigated the use of blockchain technology and its economic effects. They did an extensive literature review and exploratory study of four agri-food use cases, including IBM's Food Trust, one of the highest-profile traceability projects to increase food safety based on the Hyperledger Fabric protocol (Howson, 2020; Kramer et al., 2021; Lacity, 2022). The authors found that use cases with a high success rate typically operate in a vertical ecosystem with a working business case and urgency. Secondly, the likelihood of success increases when applications use consortium-type blockchains and when a focal firm coordinates the activities and mandates participation in the network (Kramer et al., 2021). In addition to these results, the authors also highlight the relevancy of other aspects, including that the use case must be capable of network effects and that transactions preferably should revolve around an asset. Rauchs et al. (2019) echo this finding, where they found immense growth in blockchain initiatives that attempt to harness network effects through consortiums and ecosystem building. The authors furthermore summarize two market approaches for new entrants, i.e., join an existing network or create a new one, each with its pros and cons (Rauchs et al., 2019). These approaches are correspondingly mirrored in the case of IBM's Food Trust, in which major retailers such as Carrefour, Walmart, and Albertsons have joined the network instead of creating their own (Kramer et al., 2021).

In the textile- and apparel (fashion) industry, Ahmed & MacCarthy (2021) did a case study on Lenzing, a world-leading specialized fiber producer, and their recent adoption of blockchain technology to create industry-wide traceability of their fibers. Lenzing uses TextileGenesis (a cloud-based platform based on HyperLedger Fabric) as its technology service provider (TSP). The solution adds traceability across Lenzing's significant actors in the downstream supply chain, including major retailers such as H&M, Zara, and Levi's (Ahmed & MacCarthy, 2021). The authors, however, argue that third-party audits will be necessary to validate data between the digital- and physical world and expect it to be an essential part of future approaches and standards. Furthermore, Ahmed & MacCarthy (2021) discusses the level of granularity needed for upstream- and downstream traceability and how such consideration has practical implications. Comparably, other major retailers such as BESTSELLER have also progressively adopted blockchain technology using TextileGenesis to trace fibers of more than 25 million garment pieces in 2022 (BESTSELLER, 2022).

To summarize, the literature review found that most enterprise blockchain applications generally are permissioned and private or consortiums. Also, most applications are governed by a single entity, and third-party TSPs typically operate and host the networks. Additionally, proper mechanisms must be set up to ensure the participation of actors and therefore utilize network effects. Other learnings include market strategy (join or build), configuration (buy as a service or manage yourself), the use of TTPs, and technical aspects, such as allowing for hard forks.

2.4 Decentralized Autonomous Organizations

In this section, we explore the literature's arguments for DAOs potential to break with traditional organization and governance practices and its relevance for governing blockchain-based systems. This section does not intend to define DAO; for a definition, see section 4.2. We identified 18 papers relevant to this purpose.

There is a general consensus in the literature that DAOs are still a nascent phenomenon, and thus limited literature currently exists with much ambiguity around it (Bellavitis et al., 2022; Boss & Sifat, 2022; Hassan & De Filippi, 2021; Qin et al., 2023; Saurabh et al., 2023; Wang, Ding, et al., 2019).

Wang, Ding, et al. (2019) argue that DAO is a subversion to the traditional hierarchical management model and may largely reduce organizations' costs on communications, collaboration, and management due to its inherent characteristics. Through an integrative literature review of 70 studies, Boss & Sifat (2022) found that DAO's characteristics are theoretically capable of overcoming agency problems. Murray et al. (2021) support this to some extent but conversely also imply that smart contracts may pose additional principal-owner complexity and costs, which calls for further research. Furthermore, Santana & Albareda (2022) did an integrative literature review and found that research broadly recognizes blockchain and DAO's capacity to reduce transaction costs. The authors propose a theoretical extension of DAO research from the intersection between transaction costs theory and agency theory that conceptualizes governance, value, and agency in DAOs (Santana & Albareda, 2022). According to Santana & Albareda (2022), their extension allows for studying DAO's new services, e.g., traceability in supply chain management and human-machine agency.

Applications of DAOs have mainly been in digital P2P communities with limited applications in businesses in the private sector (Santana & Albareda, 2022); however, in the last couple of years, we have started to see DAO use cases transition from experimentation to enterprise phases (Saurabh et al., 2023). However, despite the progression, our literature review found no sources referencing using DAOs to govern an industry-wide blockchain solution and no significant efforts related to enterprise consortia.

Literature specifies a variety of challenges and research gaps associated with DAOs, but the main ones are security, governance, and legality. To better guide the understanding of the issues facing DAOs, L. Liu et al. (2021) emphasize that issues associated with blockchain are thus also issues of DAOs. This inherent issue is stated by Wang, Ding et al. (2019) and McAfee & Ruane (2022), explaining how DAO security issues may arise due to the tamper-resistant nature of blockchain that makes it challenging to change vulnerabilities and errors in deployed smart contracts. Wang, Ding, et al. (2019) refer to the notorious "The DAO" attack in 2016 as an example that redirected considerable attention to blockchain governance

(Y. Liu et al., 2023). Multiple scholars have tried to address this issue (L. Liu et al., 2021; Santana & Albareda, 2022). For instance, Jiang et al. (2018) and Tikhomirov et al. (2018) have created advanced software tools for detecting smart contract vulnerabilities and security issues, including successfully detecting The DAO vulnerability.

In the paper by L. Liu et al. (2021), the authors state that DAO induces a variety of new governance issues. Ding et al. (2021) point out that existing governance theories have difficulty solving governance issues related to DAOs, including external governance posed by technical attributes of blockchain and the internal governance related to organizational mechanisms, e.g., voting, review, dispute, and so forth. On the contrary, Rikken et al. (2019) differentiate between the type of blockchain and argue that existing governance models may be feasible for permissioned blockchains, albeit still difficult. Wang, Ding, et al. (2019) argue that most DAO governance is expressed through off-chain governance, like Bitcoin and Ethereum, but may evolve to utilize a higher degree of on-chain governance. In parallel, Nigam et al. (2022) also highlight voter apathy as a challenge associated with DAO governance. The authors state that constructively participating in DAO voting requires sustained and substantial attention and that the complexity of DAOs, with many token holders, may result in so-called governance paralysis. They continue by mentioning that DAO's decentralized nature will require complex governance models to facilitate quick decision-making. In essence, "[...] sharing resources and coordinating via an ever-evolving agreed-upon set of rules is HARD" (Pop, 2022), and literature on practical guidelines and structures is scarce (Y. Liu et al., 2023; Nigam et al., 2022; Qin et al., 2023; Wang, Ding, et al., 2019).

Moreover, Nigam et al. (2022) explain how some DAO voting structures can lead to disproportionate voting power and found through a recent analysis of ten major DAOs, that merely 1 percent of all holders have 90 percent of the voting power. Keršič et al. (2022) denote this problem as the plutocracy problem, explaining how the wealthiest members (token holders) in DAOs can have the most influence and power. The authors, however, provide a solution using self-sovereign identity principles to create verifiable credentials that serve as a voting ticket in the DAO (Keršič et al., 2022). Conclusively, considering the broad nature of DAOs, the literature currently has not provided a one-size-fits-all governance model but tends to point towards its maturity, blockchain advancement, and other emerging technologies (Nigam et al., 2022; Qin et al., 2023; Santana & Albareda, 2022; Wang, Ding, et al., 2019).

Many scholars also highlight the legality challenge surrounding DAOs, discussing their unclear legal status and how this obfuscates the liability and accountability of its members, the implications of DAOs' automated characteristics, and calls for caution concerning legal issues (Hassan & De Filippi, 2021; L. Liu et al., 2021; McAfee & Ruane, 2022; Santana & Albareda, 2022; Wang, Ding, et al., 2019).

To summarize, our literature review of DAOs found exciting promises of overcoming traditional, complex, and sometimes costly organizational issues such as agency and its potential as a contemporary form of governance. That said, DAOs are a nascent phenomenon and face a lot of uncertainty and challenges, including effective governance mechanisms, security, legality, and more. Also, our search did not identify any significant use cases of DAOs as an application to govern enterprise blockchain solutions. Consequently, many scholars call for further research on related guidelines for realizing DAOs' proclaimed benefits.

2.5 Cooperativism and DAOs

To understand whether or not traditional cooperativism can be used to inspire the use and creation of DAOs for this thesis, we will be investigating what the literature says about the two topics. First, we identified some key literature to understand the cooperative movement and cooperativism, and then we found literature where the two topics were both mentioned, this resulted in 8 pieces of literature.

> DAOs are en vogue; the promise and ethos of DAOs are novel but not new. Over 200 years before their transfer onto the blockchain in the form of DAOs, cooperatives have solved governance problems in a democratic and accessible way. (Flemming & Djuric, 2022)

Flemming & Djuric (2022) states that few of the aspects that are defined as DAO are new; DAOs do not need to reinvent the wheel, but what is different is the "complete digitalization of the cooperative organization, now called platform cooperatives" (para 6).

Scholz (2016) states that one of the issues with modern cooperatives is that they are becoming increasingly global, and the trust between local organizations and their members is no longer a given. Other issues with traditional cooperatives have been identified by (Nabben et al., 2021), which state scalability, participation, free riding, accountability, and transparency as issues. Further supported by Hildebrandt & Brandi (2017), which states that aspects such as transparency, scalability, flexibility, and delegation of responsibility, globalization, digitalization, and the sharing economy are issues that the traditional cooperative movement has to deal with now and be aware of in the next 100 years.

Scholz (2016) states that the implementation of blockchain technology could provide this new version of cooperatives with a layer of trust because it allows for "middle-man-free peer-to-peer market places" (p. 24). It is further supported by other scholars that the traditional cooperativism principles could be used to design DAOs and learnings from traditional cooperativism could offer synergy effects for both parties, but also an opportunity for mutual learnings (Argast, 2022; Robey, 2022; Sardius, 2022). Nabben et al. (2021) also defines a new form of cooperatives, found more recently that being *platform cooperatives* defined as "fundamentally cooperatives facilitated by digital platforms, with shared ownership and democratic control over the platform" (p. 2). While this new type of digital cooperative paves the way for the cooperative movement to be relevant in the 21st century, it is still not perfect. With Nabben et al. (2021) stating that while DAOs face many similar challenges and could benefit from the body of knowledge and experience in the field, DAOs due to the experimentation in governance mechanisms, scalability and transparency, it may also create new tools for platform cooperatives (p. 15).

Ultimately literature states that there are gaps in this area of research due to DAOs both social and technical areas of relevance, and therefore, it can be hard for scholars to thoroughly research the phenomenon (Nabben et al., 2021). With Nabben et al. (2021) concluding that "In both platform cooperatives and DAOs, there is still a lot that can be learned in terms of governance for sustainable, participatory organizations, which calls for further research into how these communities could benefit one-another in practice." (p. 17).

2.6 Summary

Initially, our search of literature resulted in 3.932 sources that we subsequently, through multiple steps, reduced to 77, as seen in Figure 1. We then unfolded the themes on which our search strategy was based, in an endeavor to explore and answer our following research questions.

1. What potential does blockchain technology pose in the fashion- and textile industry?
2. What can we learn from current enterprise blockchain applications?
3. What is a Decentralized Autonomous Organization, and how does it compare to cooperativism?
4. How can DAOs be used to govern an industry-wide blockchain solution?

Initially, we found a large amount of research studying how blockchain can alleviate issues of transparency, traceability, and authenticity in the FTI. The consensus in the research was that blockchain technology could help negate some of the issues proposed by the current business models in the industry. It could help solve supply chain issues, sustainability, and intellectual property rights. However, there is still research to be done on implementation strategies to steer past some of the challenges associated with blockchain. These challenges included price, technology maturity, standardization, and integration, especially for companies not controlling their entire supply chain. Despite all the proclaimed benefits of blockchain, there has not been a comprehensive scaled industry-wide solution. Instead, large brands are responsible for most of the blockchain initiatives.

Secondly, we found that blockchain enterprise applications are still in their infancy, but the landscape is progressively changing. From the inspected applications, we learned that all revolved around transactions between actors in a given ecosystem. We found that most blockchain applications are private or permissioned consortiums and have a high level of centralization, and use TTPs, e.g., as seen in Walmarts DL Freight. Furthermore, we learned that there are essential considerations to be done before adopting blockchain, e.g., deciding on critical governance issues and how that may yield different results, as seen in the case of TradeLens, DL Freight, and IBM FoodTrust.

Thirdly, we found that DAOs, as a contemporary form of organization, provide great promises for overcoming traditional hierarchical management issues and provide a new form of collaboration and governance. However, we also found that DAOs can serve various functions, and there is still much ambiguity surrounding them. Some of the main challenges currently faced by DAOs include security, legality, and governance issues. Our literature review did not identify any relevant research for enterprise adoption of DAOs or to utilize it for governing industry-wide blockchain solutions. Nevertheless, our literature review implies that DAO possesses relevant properties for governing an industry-wide blockchain solution but lacks a precise prescription. Many scholars highlight the need for more theoretical and empirical research on DAO, particularly guidelines on governance-related issues and establishing some sort of standards.

Lastly, we found that few scholars have started to identify similarities and synergy effects between the cooperative's business model and DAOs. We also found that platform cooperatives seem to be the evolution of the cooperatives business model to bring it to the digital age. Nevertheless, the few scholars exploring this topic seem to agree that cooperativism design principles could potentially be helpful for the design and enhancement of DAOs. This modest research shows the potential synergy between cooperativism and DAOs; however insufficient knowledge of how this synergy is applied.

To conclude, we deem that our first and second sub-question is answered adequately by this chapter. Furthermore, it became evident that the supply chain was the most prominent blockchain application in FTI. Therefore, we narrow the blockchain solution element of our research question to supply chain blockchain solutions going forward. Likewise, we discovered that DAOs hold great potential as a means of governing an industry-wide blockchain solution, and we will therefore assign DAO to the governance element going forward.

Consequently, we adjust our research sub-questions accordingly, which the study will be using going forward:

1. What blockchain design considerations are relevant for an industry-wide blockchain solution in the fashion- and textile industry?
2. How should a DAO be designed to govern an industry-wide blockchain solution?

3. Methodology

This chapter explains the methodological approach to our study, i.e., the practical "how" of our research and the considerations of the choices. Specifically, the chapter describes the choice of research paradigm, research philosophy, research approach, data collection methods, interview design, and more. Doing so allows the reader to understand and follow our research and critically evaluate it.

3.1 Research paradigm

This thesis adopts *Design Science Research (DSR)* as the research paradigm. While there are many genres of DSR (Brocke et al., 2020; Peffers et al., 2018), we adopt the one by Peffers et al. (2007), i.e., Design Science Research Methodology (DSRM) as seen in Figure 4. DSR is generally used within information systems (IS) research and is fundamentally a paradigm that aims to create innovative artifacts to enhance or solve real-world problems (Brocke et al., 2020). The paradigm's problem-solving orientation and iterative approach allow for innovation and creativity in producing relevant IS artifacts that contribute to theory and practice (Brocke et al., 2020; Peffers et al., 2007, 2018). Since this thesis aims to provide a practical solution to a complex phenomenon, i.e., how FTI should govern an industry-wide blockchain solution, we find DSR well-suited for this purpose. In extension, we aim to build and design an IS artifact as a framework that helps guide the effective design of a DAO.

While DSR is the underpinning paradigm, we augment our research methodology by using it in conjunction with Saunders et al. (2019) *Research Onion*. The onion helps describe and reflect researchers' various stages when forging an effective methodology. As the name suggests, the onion consists of layers representing part of the process, starting from the outer layer. As seen in Figure 2, the onion consists of six layers (1) Philosophy, (2) Approach, (3) Methodological choice, (4), Strategy, (5) Time horizon, and (6) Techniques and procedures (Saunders et al., 2019). Even though DSR is not directly applicable to the research onion and in itself is a paradigm, we consider that DSR most appropriately fitting in the Strategy-layer of the onion (Mardiana, 2020; Peffers et al., 2018). We will, throughout the chapter, uncover the respective layers in the context of DSR and our research question.

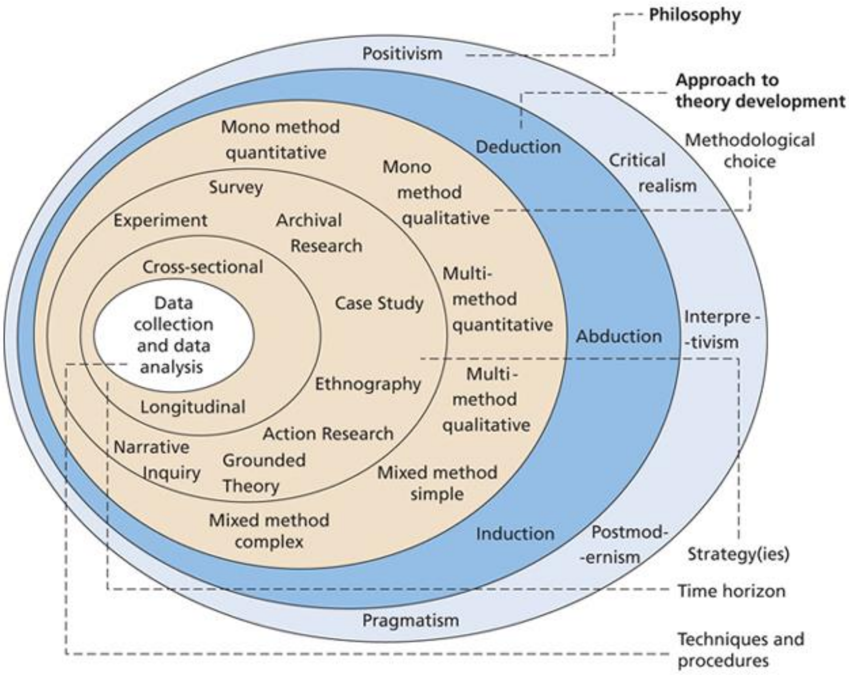

Figure 2 - The Research Onion (Saunders et al., 2019)

3.1.1 Research Philosophy

The first layer, research philosophy, refers to a system of beliefs and assumptions about knowledge development (Saunders et al., 2019). Specifically, this includes ontological-, epistemological-, and axiological assumptions that all shape the understanding of our research questions, the methods we use, and the interpretation of our findings (Saunders et al., 2019). To mention them briefly, ontology is the assumptions we make of reality, epistemology is the assumptions about knowledge, and axiology is assumptions about how our values influence our research process (Saunders et al., 2019).

This study applies a *pragmatist* research philosophy. Pragmatism is a philosophical stance "[…] that aims to contribute practical solutions that inform future practices" (Saunders et al., 2019, p. 150) and thus emphasizes focus on concepts that support action. Pragmatists seek to harmonize objectivism and subjectivism; however, the variation of each depends on the research question (Saunders et al., 2019). The pragmatist ontology centers around actions and change, where reality continuously changes based on contextual actions (Goldkuhl, 2012; Saunders et al., 2019). Therefore "to perform changes in desired ways, action must be guided by purpose and knowledge" (Goldkuhl, 2012, p. 139), i.e., knowledge and actions are intertwined. The epistemology for pragmatists also centers around the action.

In contrast to positivism, which seeks to explain, and interpretivism, which seeks to understand, pragmatist epistemology defines as *constructive knowledge* that may exhibit itself as prescriptive, normative, and prospective (Goldkuhl, 2012). In other words, knowledge is valued for giving action through, e.g., guidelines, exhibiting values, and suggesting possibilities (Goldkuhl, 2012; Saunders et al., 2019). Lastly, the role of axiological assumptions for a pragmatist is that our research is initiated and driven by our values and beliefs. Therefore, we acknowledge our role in this study and its implications. For instance, we recognize our bias in glorifying blockchain technology as a solution to what we are facing. Furthermore, we believe that qualitative in-person interviews are of more value than quantitative static surveys.

Conclusively, DSR accommodates the creative design of practically valuable artifacts that aligns well with the values and purpose of pragmatism, i.e., they both emphasize practicality and problem-solving while recognizing the particular context. This also reconciles most with our research aim, i.e., providing valuable knowledge in organizing an industry-wide blockchain solution in FTI. For instance, our main research question, "*How should an industry-wide blockchain solution in the fashion- and textile industry be governed?"* concerns multiple heterogeneous actors with distinct operations and needs. In contrast, we do not aim to produce a 'true' one-size fits all solution which is the outlook of a positivist. Also, our endeavor is not to understand and explain why a novel governance structure has not materialized, which may have been the vision of interpretivism.

3.1.2 Research Approach

Regarding theory development, there are three main research approaches: *deductive*, *inductive*, and *abductive*. In a deductive approach, a theory and hypothesis are developed and tested, while data is collected and analyzed to develop a theory in an inductive approach (Saunders et al., 2019). An abductive approach effectively combines the two by exploring a phenomenon through data, working out a theory, and then testing that theory through additional data collection (Saunders et al., 2019).

This study applies an abductive approach throughout our DSR approach to align with our research topic and pragmatist research philosophy. Abduction provides flexibility and is particularly useful in understanding complex and poorly understood phenomena, such as how to govern an industry-wide blockchain application, let alone practically applying blockchain in FTI. While abduction may start with or without a theoretical frame, it differs from deduction as the first empirical finding's purpose is not test theory "[…] but rather to facilitate the exploration of the phenomena" (Conaty, 2021, p. 3).

Likewise, this study's artifact will derive from leveraging and combining existing theories with empirical data from our iteration. As enabled by the DSR process, abduction seeks to refine the output as necessary based on new data (Saunders et al., 2019). Essentially, using abduction with DSR allows us to iteratively move from theory to data and data to theory, i.e., combining a deductive and inductive approach, thereby synergizing theory and observed data into an IS artifact as seen in Figure 3.

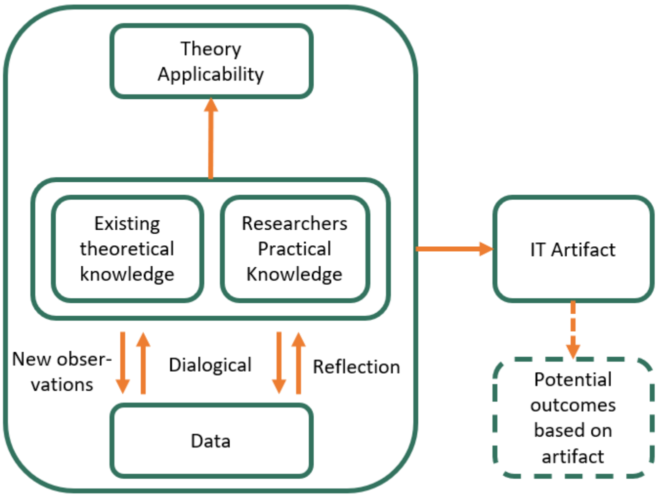

Figure 3 - Overview of Abductive Approach Extended with DSR Adapted from (Conaty, 2021)

3.1.3 Methodological Choices

The research onion by Saunders et al. (2019) suggests three distinct choices for conducting research: (1) quantitative, (2) qualitative, and (3) mixed methods. These three choices have a further set of options of conducting a mono, multi, simple mixed, or complex mixed (Saunders et al., 2019). The nature of the DSR approach and the type of research question sought to be answered in this research, a qualitative approach will be applied. This is supported by the need for a non-quantifiable answer to figure out how to govern an industry-wide blockchain solution in the FTI. According to Kelemen & Rumens (2008), the choice of the multi vs. mono method is not the most important, but the ability to provide relevant, reliable, and well-documented data to advance the research is important. As described later, our study will be drawing from multiple sources of information to help understand the research topic better, and therefore it will be conducted as a multi-method qualitative study.

3.1.4 Research strategy

As elaborated at the beginning of the methodology, we chose the DSR approach as the primary research paradigm. Our research question seeks to explore a poorly defined topic, and the recentness of DAOs and blockchain will require our research to be creative, exploratory, and flexible, which DSRM allows it to be (Peffers et al., 2007).

The research project will adhere to the DSRM, which is displayed and contextualized in Figure 4. While the iteration and figure display a sequential order, Peffers et al. (2007) state that researchers can start at any step (entry point) and move outward. The DSRM contains six steps, (1) *problem identification, (2) defining objectives of a solution, (3) design and development of the artifact, (4) demonstration, (5) evaluation,* and (6) *communication.* The last two steps of the model, evaluation and communication, allow a revisit to (2) define objectives or (3) design and development.

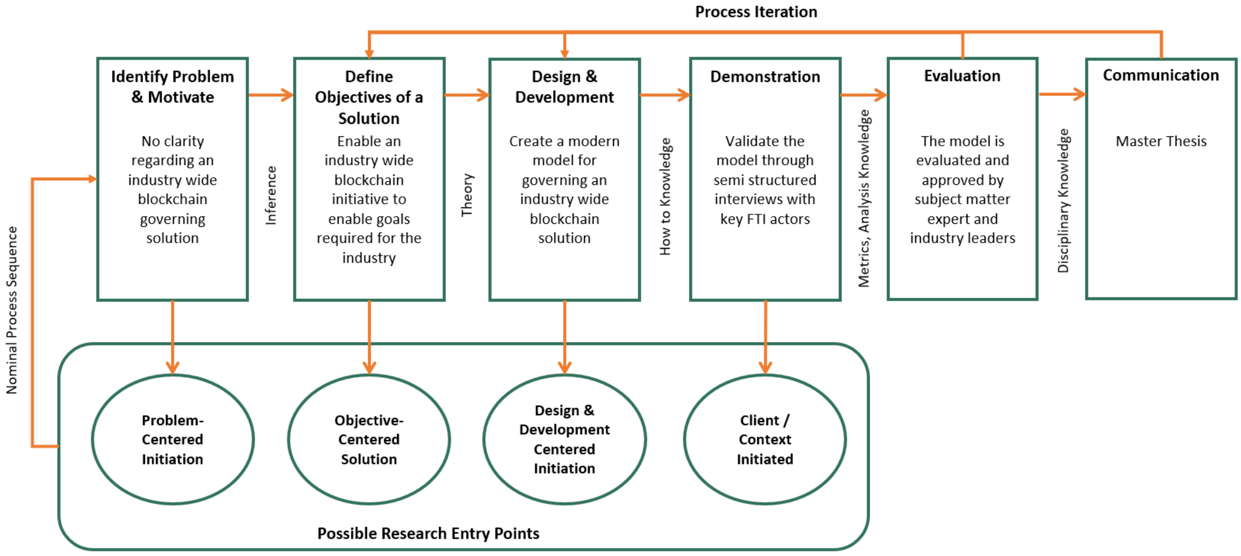

Figure 4 - Adapted DSRM Description by (Peffers et al., 2007)

1: Problem Identification and motivation: The first step seeks the particular research problem and justifies the value of a solution. Peffers et al. (2007) highlight the importance of breaking down the research problem due to its use in developing an effective solution, and a conceptual dissection of the problem may help grasp its complexity. Secondly, the justification of the solution accomplishes two things. Firstly, it helps the reader value the researcher's understanding of the problem and motivates readers and researchers to pursue a solution (Peffers et al., 2007). This step will require a thorough understanding of the problem and a justification of the solution, which we seek to create and understand through exploratory data collection with interviews and a literature review, e.g., business reports and research literature.

2: Objectives of a solution: The second step involves deducing the intended outcomes of a solution based on the given problem description. These outcomes might be qualitative, quantifiable, indicating improvements over existing solutions or suggesting novel approaches to address previously unexplored problem domains (Peffers et al., 2007). Exploration of these objectives should be grounded in understanding current knowledge in the domain, including existing challenges and potential solutions, if any.

3: Design and development: This step is where the artifact is created. An artifact broadly defines as "constructs (vocabulary and symbols), models (abstractions and representations), methods (algorithms and practices), and instantiations (implemented and prototype systems)" (Hevner et al., 2004). Peffers et al. (2007) state that the desired functionality, architecture, and creation of the actual artifact takes place here, and it requires knowledge of theory to develop the design into a solution. This thesis strives to develop an IS artifact represented as a model covering the different dimensions of a DAO related to FTI and governing an industry-wide blockchain solution.

4: Demonstration: This step demonstrates the artifact's efficacy on the problem. There are many ways of conducting this demonstration, with Peffers et al. (2007) highlighting experimentations, simulations, case studies, and other appropriate tasks. It is required to effectively know how the artifact should be used to solve the problem. For the demonstration to create additional value, we will interview participants from the fashion industry and domain knowledge experts to determine the artifact's value on the defined problem.

The participants from the fashion industry were chosen with a non-probability sampling method, more specifically purposive sampling, with the intention of "representation" of both large-scale industry players and small to medium size industry players (Palinkas et al., 2015). While this approach is beneficial regarding time, participant knowledge, and information validity, it also presents potential issues of volunteer bias and errors of judgment by researchers and is not necessarily representative of the entire FTI (Etikan, 2016).

5: Evaluation: For this step, the artifact is observed and measured as a solution for the issue. The evaluation involves the comparison of the outcome goals for the conceptualized solution and the actual outcomes' obtained from demonstrating the artifact in step four. This evaluation could take the form of a comparison to the objectives in step two or objective quantitative performance measures (satisfaction surveys, budgets, or client feedback) or system-related performance metrics (e.g., scalability or response time) (Peffers et al., 2007). Therefore, the researchers must encompass knowledge regarding relevant metrics and analysis techniques. After the evaluation, researchers can choose to iterate back to step 3 to improve the effectiveness of the artifact or continue to the communication step and leave further improvements for further research. We conduct interviews with industry players and subject matter experts to evaluate our artifact, and the feedback will be captured and coded.

6: Communication: The final step includes communicating about the problem and its importance, the artifact and its utility and novelty, the rigor of its design, and its relevance (Peffers et al., 2007). Peffers et al. (2007) state that scholars can use the DSRM to structure their papers instead of the traditional nominal structure of an empirical research process. We will document and communicate the artifact in the form of this master thesis, where the structure of the thesis will follow that of the empirical research process, but the analysis in which we create our artifact will follow the DSRM.

3.1.5 Time Horizon

The next layer of the onion by Saunders et al. (2019) is the time horizon layer, where the researchers have to decide whether to look at a particular snapshot in time or want to create a study more akin to a diary with a series of snapshots throughout time (Saunders et al., 2019). Since the fashion industry is facing these challenges now and many decisions have to be made now, we have chosen the cross-sectional approach to look at this phenomenon. A longitudinal study could be created when many rudimentary decisions have been made, but as this situation is new and current, we do not deem it feasible or valuable for this thesis. We will conduct our snapshot at two points in time, but despite it covering a broader period, it is still concentrated enough to be cross-sectional (Saunders et al., 2019).

3.1.6 Techniques and Procedures

The center layer of the onion is where we denote the practicalities of our research regarding techniques and procedures that contribute to this study's overall validity and reliability (Saunders et al., 2019). Specifically, this layer intends to explain how the data for our research is collected and analyzed.

3.1.6.1 Data Collection

To provide an overview of our data collection types (primary- and secondary data), techniques, subjects, and objectives in the context of the research of this thesis, Table 2 has been created.

Table 2 - Overview of Data Collection Types, Techniques, Subjects, and Objectives

Type	Technique	Subjects	Objective
Primary Data	Semi-structured Interview	GreenCotton; BESTSELLER; SPOOR; GANNI; Deloitte; Lifestyle&DesignCluster	Gather empirical data from relevant industry actors in FTI, blockchain, and DAO domains to verify existing and obtain new knowledge to contribute to our research ultimately. Demonstrate and evaluate our findings and IS artifact.
	Workshop observation	Industry project workshop2 at CBS comprising researchers and various FTI actors	
	Workshop observation	Industry project[1] workshop1 (kick-off) at BESTSELLER comprising researchers and various FTI actors	
Secondary Data	Semi-structured Interview transcription	Delegate and former investor from MakerDAO	Gain a unique perspective from a large established DAO to learn from their experiences and support analysis.
	Literature	Journals; Articles; Websites; Videos; Reports; Conference Papers; Whitepapers; Other	Establish a theoretical foundation of knowledge and understanding of FTI, blockchain, and DAO to inform our research design and build on existing knowledge.

3.1.6.2 Data Analysis

All interviews conducted for this research were recorded by audio and transcribed in the language they were conducted in. When possible, we strived to interview the participants in their native langue to ensure the value and correctness of the description and answers of the participant (Baumgartner, 2015). Consequently, the transcriptions appendices will vary from Danish and English. However, we ensure that all quotes used in the thesis are translated into English to the best of our ability and cross-reference them using DeepL[2]. For our workshop observations, we did not transcribe or document *Workshop1* (project workshop1) and merely transcribed notable quotations from *Workshop2* (project workshop2). All our transcriptions can be seen from Appendix C. Additionally, we leverage secondary data from a

[1] Read more about the industry project here: https://ldcluster.com/portfolio-item/blockchain-iot-reseller/
[2] An Neural Machinelearning service for translation

semi-structured interview with MakerDAO actors done by other researchers. Consequently, we simply attach the raw transcribed interview data in Appendix E.

3.2 Operationalization and Coding Process

In support of Figure 3, we start with our existing theoretical and practical knowledge to create our questions. We define a set of main theoretical models to operationalize questions for our semi-structured interviews with the actors in the FTI and Deloitte, and LDCluster. Table 3 shows an example of an agency theory operationalization, focusing on conflicts that led to the questions shown.

Table 3 – Example of operationalization

Theory	Category	Question
Agency Theory	Agency Conflicts	What is the relationship between your supply chain partners? - Do you know all participants of the supply chain? - Are they trusted?

After each interview, we listened to the recorded audio and read the transcriptions to explore and familiarize ourselves with the data. From our first interviews with GreenCotton we initially developed a set of categories comprising five themes, Blockchain, Agency, Collaboration, Platform, and Cooperativism, which we began coding into a table. Each of us revisited the coded data to ensure consistency and accuracy. We then analyzed the data and interpreted the findings for our analysis iterations. However, in part due to our abductive approach, we identified some responses relevant to our research question but not covered by our theoretical model; therefore, we introduced co-opetition as a new theoretical concept and dismissed collaboration theory. For the interviews with Deloitte and LDCluster, we operationalized our IS artifact and thus developed seven different categories to reflect the framework, repeating the above process. The coding process was done individually to ensure we captured all data from the participants that could be relevant to our thesis. Our operationalization, interview questions, and coding tables is seen in Appendix D.

4. Theory

This chapter provides a detailed overview of the theoretical framework that shapes the foundation for the thesis' subsequent analysis and research. We examine theories and concepts from existing literature and will highlight their relevance to our research questions at hand.

Our literature review implies that DAOs possess relevant characteristics for governing an industry-wide blockchain solution. However, considering the recency of DAOs, literature and empirical findings on this form of applicability in FTI are limited to non-existent. Consequently, we draw on theories from multiple schools of thought to complement and inspire the design of DAO and ultimately answer our research question. As seen in Figure 5, we will complement the design decisions of a DAO from three points of view: technology, governance, and organization.

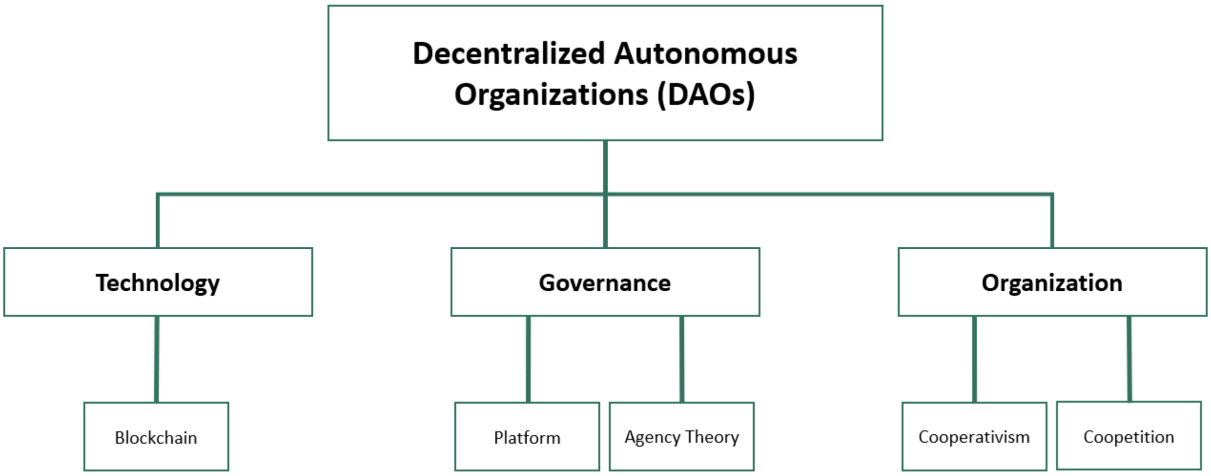

Figure 5 - Theoretical Framework Overview (Own Creation)

We begin by explaining the underlying technology enabling DAOs, blockchain. We describe the technology from a conceptual outlook and examine some of its key properties required to understand its application for FTI and enablement of DAOs. We continue by examining DAOs and specifically unfolding critical components necessary for engaging in a DAO in the context of this research.

We introduce governance and the different terms of governance found throughout literature, traditional organizational theory, and DAOs to understand the differences. Then we describe different aspects of Agency Theory to understand how DAOs seek to eliminate these. We finish the governance section by explaining different platform theory aspects to understand how these could potentially help flourish and design the DAO.

Lastly, we will introduce the organizational point of view, which incorporates aspects of traditional organizational theory. We explain the concept of cooperativism as a source of inspiration in our design analysis of DAOs and then introduce the concept of co-opetition to analyze the dynamic and complex interplay between the FTI companies in the context of a DAO.

4.1 Blockchain

The purpose of establishing the theoretical frame of blockchain serves two purposes. Firstly, blockchain enables DAOs, the focal point of this thesis, and therefore understanding blockchain allows us to understand the functioning of DAOs. Secondly, the purpose of DAO in our research context is to govern an industry-wide blockchain solution; thus, to effectively design the DAO, it is necessary to understand the purpose at hand.

We define blockchain and its essential components and describe its most prominent characteristics. We then examine the types of blockchains and how they differ to determine which type is most suitable for FTI. We continue by describing how blockchain technology enables smart contracts to understand their materiality for DAOs, and what risk and scrutiny they require.

4.1.1 Blockchain characteristics

Firstly, let us briefly delve into blockchain and its characteristics to provide context for the related benefits and challenges in FTI and later discussion. The concept of blockchain commenced from the whitepaper of Bitcoin in 2008 by an anonymous source under the pseudonym of Satoshi Nakamoto (Nakamoto, 2008). The endeavor of Bitcoin – the first decentralized cryptocurrency - was to solve the infamous double-spending problem of digital currencies and thus catalyze the break with the traditional trust-based model of having a financial intermediary (Nakamoto, 2008). Even though that Nakamoto (2008) does not explicitly mention or define blockchain, they describe it as a sequential record of blocks (holding data) linked and secured to each other using cryptography, hence the name blockchain. Furthermore, the technology adopts a peer-to-peer (P2P) network protocol in order to communicate and validate transactions in the network, thus creating a decentralized architecture. The simple yet groundbreaking whitepaper was the catalyst for blockchain as we know it today (Zheng et al., 2017). Figure 6 presents an example of a blockchain (ledger) showing the sequence of blocks and how they are related using hashing, i.e., a cryptographic technique that produces a unique encrypted version of an input (Di Pierro, 2017).

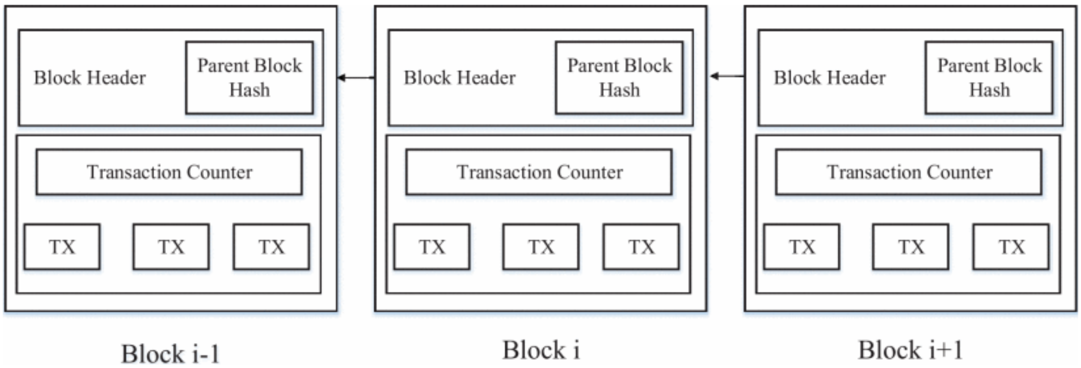

Figure 6 - Blockchain Illustration from (Zheng et al., 2017)

Each block comprises a *block header* and a *block body.* The block header includes information such as timestamp, parent block hash, and a nonce (a random number used in the mining process), whereas the block body consists of the transaction data (Zheng et al., 2017). For instance, the data might include data related to cryptocurrency transactions, such as sender and receiver addresses, and other data, including fees and signatures. The very first block of the blockchain is called the genesis block.

Essentially, blockchain has the following key characteristics:

Decentralization: Decentralization is at the core of blockchain and perhaps the most prominent characteristic (Gupta, 2020; Liu, 2021; Viriyasitavat & Hoonsopon, 2019; Xinyi et al., 2018; Zheng et al., 2017). Blockchain technology disintermediates the conventional centralized trusted authority through its network architecture and consensus mechanism so that the network nodes collaborate to validate and verify transactions instead. Consequently, since each node in the network keeps a complete copy of the blockchain, it diminishes the need for central storage and a single point of failure, making it more robust, reliable, and secure the higher the decentralization.

Consensus-driven: Blockchain networks operate using a consensus mechanism (e.g., proof of stake or proof of work) that provides a set of rules for validating a block and thus ensures and governs legitimate transactions. In the context of blockchain, Shrimali & Patel (2022) defines consensus as a "[...] decision of the game of harmonization among multiple untrustworthy entities through a message-passing mechanism to achieve reliability and fault-tolerance in a multi-agent system" (p. 7). In practice, this is typically referred to as 'mining,' where the nodes (miners) aim to solve a cryptographic puzzle using their local computational power. Once a node has solved the puzzle, the solution will be broadcasted to the rest of the nodes in the network, which then validate and approves the solution to be appended to the blockchain.

Immutability: It is practically impossible to alter a block once it has been added (Lacity, 2022; Zheng et al., 2017). This is due to its cryptographic hash algorithm that couples all of the blocks and thus information (Xinyi et al., 2018), so a change in one block would require a change in all other blocks. While theoretically possible, it is practically next to impossible, considering that the nodes are benign and the amount of computing power required. It will likewise be straightforward to discover and track if a corrupt or invalid block is added. Each incremental block strengthens the immutability of the blockchain as more blocks add to the complexity of altering it, making it perfect for audibility (Viriyasitavat & Hoonsopon, 2019).

Traceability and transparency: All transactions in a blockchain are generally transparent to its network participants (depending on the network type), allowing each participant to audit the transaction. Likewise, tracing and verifying the transaction history is straightforward since each block links to its preceding block through timestamps and hash values. This also means there is no deception between nodes, and any malicious behavior would be easy to observe (Xinyi et al., 2018). As we discuss next, the degree of transparency and openness may vary from the type of blockchain.

The characteristics of blockchain technology make it a compelling fit for many purposes, and applications have moved well beyond decentralized payments (called *blockchain 1.0*) (Cai et al., 2022; B. Liu, 2021). Among others, by understanding the fundamentals of blockchain, we likewise understand how it poses compelling use cases in FTI scenarios due to its trustlessness, traceability, and transparency characteristics to optimize operations. By trustlessness, we refer to that "you do not need to place your sole trust in any one stranger, institution, or other third party in order for a network or payment system to function" (Cryptopedia, 2022). However, there are also scenarios in which it moves beyond monetary aspects into social and humanitarian development (Cai et al., 2022).

To better understand the overall blocks comprising an enterprise blockchain solution, Rauchs et al. (2019) segregate blockchain into three layers, namely (1) protocol, (2) network, and (3) application. These layers can be used as mental-model to navigate various blockchain components and changing landscape. The protocol layer constitutes the fundamental building blocks of the blockchain system and provides the general infrastructure which the network and applications are built (Rauchs et al., 2019). Protocols are simply put code (either open-source or proprietary) and deal with consensus mechanisms, data structures, smart contract functionality and more. Examples include Ethereum, Hyperledger, Corda, Bitcoin. On top of the protocol layer is the network layer that essentially brings the blockchain to live through the P2P network of participants, establishing security and a shared source of truth (Rauchs et al., 2019). The last and top layer, application, comprise "the products and services that create actual business value" (Rauchs et al., 2019, p. 22). This includes the actual interfaces and tangible services produced from the protocol and network layer. In a supply chain context, this could involve systems used to manage supply chain processes, e.g., Enterprise Resource Planning, Customer Relationship Management, and Warehouse Management systems.

4.1.2 Types of blockchains

Different types of blockchains are categorized based on the degree of decentralization, openness (access rights), and consensus mechanism (rights of validation) (Fernandez-Carames & Fraga-Lamas, 2018; Lacity, 2022; Zheng et al., 2017). At a high level, access to the network is either *public* or *private,* and transaction validation access is either *permissioned* or *permissionless*. That said, it is important to stress that these categories are generally synonymously used, in which authors typically divide them into three types: (1) private - permissioned, (2) public – permissionless, and (3) consortium - permissioned (Fernandez-Carames & Fraga-Lamas, 2018; Xinyi et al., 2018; Zheng et al., 2017). However, we separate the types into four general structures to clarify the distinctions and flavors.

Public blockchains are permissionless, allowing everyone to participate in the network. All nodes have equal rights and can read, write, and validate transactions and append blocks, making the blockchain utterly decentralized with no central owner. Due to its high level of decentralization and the number of nodes, it is nearly impossible to tamper and provides a high level of transparency; however, it also comes with a slower transaction speed (Xinyi et al., 2018). Generally, this type of blockchain is used for exchanging cryptocurrencies, e.g., networks such as Bitcoin and Ethereum. Subsequently, nodes in the network are incentivized to act as *miners,* i.e., nodes that use their computing power to validate transactions and append blocks in return for a crypto reward, essentially acting as a bank teller (Wegrzyn & Wang, 2021).

Private blockchains are permissioned blockchains only open to authorized nodes and controlled by a single entity (usually an organization). If granted permission, the single entity determines the respective nodes' rights (read, write, etc.) and consensus mechanism. Zheng et al. (2017) regard private blockchains as centralized networks, making it easier to tamper with the blockchain than public blockchains. There are currently few applications of private chains; however, applications are mainly targeted for internal enterprise operations and auditing (Cai et al., 2022) and where data is susceptible to only a few selected actors. In turn, this makes the blockchain more efficient in terms of transaction speed since fewer validators exist.

Consortium blockchains are private permissioned blockchains controlled by a polycentric entity, usually a group of organizations. Similar to private blockchains, authorization is also required to join the network, which usually grants rights to participate in the transaction but no validation rights (Xinyi et al., 2018). The consensus mechanism is usually operated by selected internal nodes acting as the bookkeeper to validate, generate, and copy the block. As a result, this structure is centralized but typically provides a higher level of decentralization, efficiency, and data security and may enjoy a higher level of immutability yet still be susceptible to being tampered with. That said, the degree of centralization/decentralization is specific to the network size and granted rights. This type of blockchain is typically seen in industry applications comprising multiple ecosystem actors. However, consortium blockchains can be cumbersome to set up since it requires a level of cooperation between a multitude of organizations (Wegrzyn & Wang, 2021).

Hybrid blockchains may be either permissioned or permissionless and typically owned by a central authority with a level of oversight by a public chain (Wegrzyn & Wang, 2021) and, therefore, unable to be tampered with. Therefore, hybrid blockchains are a combination of private and public and "[…] can make the transactions private but still verifiable by an immutable record on the permissionless blocks" (Cai et al., p. 53031). However, there are nuances to hybrid blockchains as the degree of, e.g., openness and centralization are customizable to each use case. For instance, EOS.io allows everyone to validate nodes but only permission selected nodes to append blocks (Lacity, 2022). Examples include IBM Food Trust, which employs public-private features in its network (Wegrzyn & Wang, 2021).

Wang, Ouyang, et al., 2019) provides an excellent overview of the different types and their differentiation in various properties, as seen in Figure 7.

Parameters	**Permissionless**	**Private**	**Consortium**	**Hybrid**
Network	Decentralized	Centralized	Centralized	Hybrid
TPS	Low	High	High	High
Visibility & Participation	Open	Restricted	Restricted	Varies
System Governance	Hard	Easy	Medium	Varies
Security	Varies	High	High	High
Examples	Bitcoin, Ethereum, EOS	MultiChain	Hyberledger Fabric	XinFin

Figure 7 - Blockchain comparison types from (Wang, Ouyang, et al., 2019)

Understanding the different types is crucial for anyone using blockchain, as the type should correlate with the specific objective. For this thesis, the above allows informed decision-making in our analysis when designing a fitting solution for FTI and their respective objectives.

4.1.3 Smart Contracts

Simply put, *smart contracts* are programs encoded on a blockchain that executes a set of actions once certain conditions are met. The term was first proposed in the 1990s by Szabo (1996), that defined a smart contract as "[…] a set of promises, specified in digital form, including protocols within which the parties perform on these promise" (para 1). It was not until the emergence of blockchain technology and particularly Ethereum that smart contracts in its true sense saw its light (Wang, Ouyang, et al., 2019). Smart contracts are built around "If-Then" logic and generally have two core attributes: *value* and *state* (Wang, Ouyang, et al., 2019). The logic and terms of the conditions are predetermined and agreed upon by the involved participants, who then deploy the smart contract on the blockchain, making it tamper-resistant (Wang, Ouyang, et al., 2019). Once deployed, the smart contract awaits execution once its conditions are met that are typically based on the trusted data feeds from so-called *Oracles,* i.e., external data sources that provide data from other applications, e.g., weather data, stock prices, and shipment info (Wang, Ouyang, et al., 2019). Given that the conditions are met, the smart contract broadcasts to the network, which then verifies and validates the transaction and chains it into the blockchain upon consensus (Wang, Ouyang, et al., 2019). Figure 8 shows a high-level overview of a typical process. However, many smart contracts are far more advanced and may be customized to the specific use case.

Consequently, smart contracts provide a range of benefits, including speed, efficiency, accuracy, and savings due to the digital automated nature and disintermediation that reduces transaction costs (IBM, n.d.). Additionally, since smart contracts operate using blockchain technology, they provide trust, transparency, and security as transactions are shared across the network and are almost impossible to alter (IBM, n.d.). However, smart contracts also enjoy the immutable characteristic of blockchain and abide by *code-is-law*, leading to numerous possible security vulnerabilities and malicious exploits (Santana & Albareda, 2022; Wang, Ouyang, et al., 2019). A notorious example of perhaps the most significant smart contract vulnerability was seen in the case of *The DAO* in 2016. The DAO was the biggest crowdfunded project ever; however, a smart contract vulnerability led to an exploit that resulted in more than $30 million drainage three weeks into its launch (DuPont, 2017; Siegel, 2023). Operationalizing complex business logic on a smart contract should therefore be carefully scrutinized.

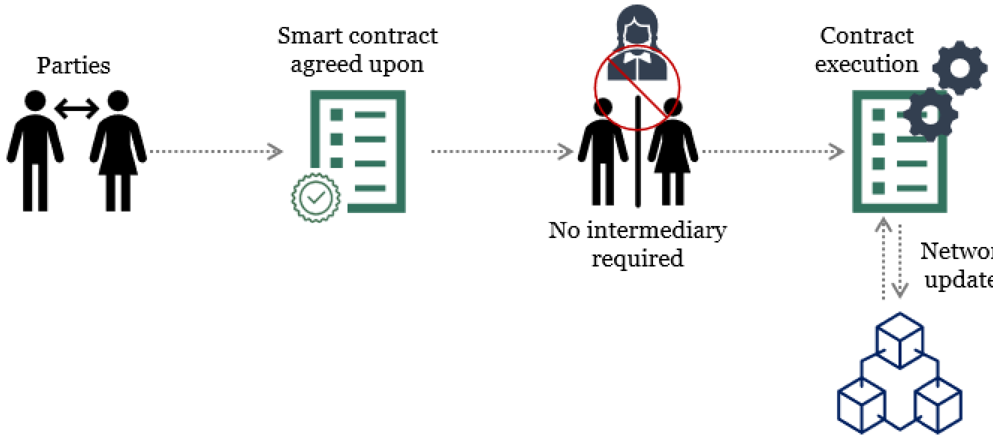

Figure 8 - High-Level Smart Contract Process (Own Creation)

There are many use cases for smart contracts. For instance, in finance, they may enhance transparency and trust among the participants while reducing transaction- and administrative costs (Wang, Ouyang, et al., 2019). Other examples include supply chain and logistics, decentralized energy markets, IoT to automate complex workflows, and lastly, management such as digital properties and organizational management, including DAOs which we will discuss in the next section.

In extension hereof, smart contracts enable the functionality of so-called *decentralized applications (DApps).* DApps are similar to conventional web applications but run on a P2P network (blockchain) rather than a cloud service or on-prem servers (Banafa, 2022). In this context, DApps typically employ the same front-end technologies (e.g., HTML/CSS and Javascript), but instead of using an API to connect to the database, they utilize smart contracts to operate core functionality and connect to the blockchain (Banafa, 2022; Wang, Ouyang, et al., 2019). Ethereum is currently considered the best blockchain for building DApps (Dmytro, 2023) and typically hosts three types of applications: (1) financial applications, (2) semi-financial applications, and (3) governance applications (Banafa, 2022).

To summarize, smart contracts allow for a range of functions in various scenarios, including enabling DAO, the focal point of this thesis. Therefore, to fully comprehend the limitations and possibilities of a DAO, we must understand smart contracts and their implications to guide our DAO design for FTI.

4.1.4 Summary for blockchain

As outlined in this section, blockchain is a distributed, decentralized and immutable ledger that enables parties to transact with each other securely and transparently. This is achieved through key properties such as cryptography, distributed network, and consensus mechanism, and it provides extended functionality through smart contracts. By unfolding blockchain at an overarching level, we set the stage for our analysis of the most appropriate solution for FTI and likewise provide context and groundwork for understanding DAOs.

4.2 Decentralized autonomous organizations

Cogita Roma, sed sine Caesare – think of a Rome, but without a Caesar.

Decentralized Autonomous Organizations (DAOs) are the centerpiece of our research and, therefore, crucial to theoretically examine. Specifically, this section provides conceptual clarity and a precise definition of a DAO that guides a proper and focused analysis. We focus on DAO components relevant to our research question, e.g., we do not delve into technical properties or legal matters. Instead, we generally concentrate on governance-related aspects of DAOs to address our research question effectively. Furthermore, by describing the critical components, we provide the reader with context for our analysis and design choices enabling them to evaluate our result.

We begin by defining DAOs and their characteristics and provide an overview of different types of DAOs. We continue by describing the core governance components of DAOs, including Tokenomics, and highlight some systems and models that are currently used. Lastly, we highlight an industry framework available for creating DAOs.

4.2.1 DAO Definition

To this date, many coexisting definitions of a DAO exist, and those that exist are usually specific to the specific context of application (Hassan & De Filippi, 2021; Santana & Albareda, 2022; Saurabh et al., 2023). The lack of a uniform definition can make it somewhat obscure to grasp its functions and potential. Since its conceptualization by Vitalik Buterin in the Ethereum whitepaper in 2014 (Buterin, 2014; polarpunklabs, 2022), DAOs have occupied many functions and absorbed new attributes, hence its many definitions.

That said, this thesis adopts the well-cited definition by Hassan & De Filippi (2021), which defines a DAO as "[…] 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 decentralized (i.e., independent from central control)." (p.2). We chose this definition because it is short and simple and converged from interdisciplinary experts and literature. However, we find it necessary to extend this definition by stating its purpose, i.e., the collective management of a collective mission.

As defined by Wang, Ding, et al. (2019), a DAO has three essential characteristics.

- **Distributed and Decentralized** – Unlike traditional organizations, DAOs have no centralized authority or top-down hierarchy. They are instead democratized through decentralization and distribution of voting rights. As a result, the DAO is self-governing through a P2P network in which members partake in collective action and decision-making.
- **Autonomous and Automated** – DAOs mainly abide by the *code-is-law* principle (Santana & Albareda, 2022; Wang, Ding, et al., 2019). They are operationalized by the automated rules encoded on the smart contract defined- and agreed upon by the DAO stakeholders. These rules facilitate the trust between the members and minimize transaction and communication costs associated with the interactions.
- **Organized and Ordered** – The operational rules of a DAO and its members' responsibility, authority, rewards, and penalties are entirely transparent due to the utilization of smart contracts. Through the defined governance rules, members are treated accordingly to their contribution and participation in the DAO, making the operation more orderly and coordinated (Wang, Ding, et al., 2019).

In addition to the abovementioned characteristics, Wang, Ding, et al. (2019) propose a reference model to guide the understanding of the components comprising a DAO. The reference model (see Figure 9) operates a five-layer architecture, namely *basic technology, governance operation, incentive mechanism, organization form, and manifestation* (Wang, Ding, et al., 2019). To mention them briefly, the basic technology layer encapsulates the underlying technologies that enable DAOs and its future trajectory use, e.g., using AI to enhance DAO smart contracts. The governance operation layer deals with the mechanism that realizes self-governance and collaboration, e.g., how to deal with disputes and how do we ensure effective decision-making. Thirdly, the incentive mechanism layer revolves around the token economy as incentivization – penalties, rewards, and benefits of participating in the DAO. The organization form layer involves how the DAO is organized and structured and how the form is dynamic. Lastly, the manifestation layer is how the DAO is manifested in the real world, i.e., its type and purpose (e.g., non-profit foundations, organizations, platforms, communities, etc.). The reference model and its five layers are helpful references to understand the foundational elements constituting a DAO – in design or analysis.

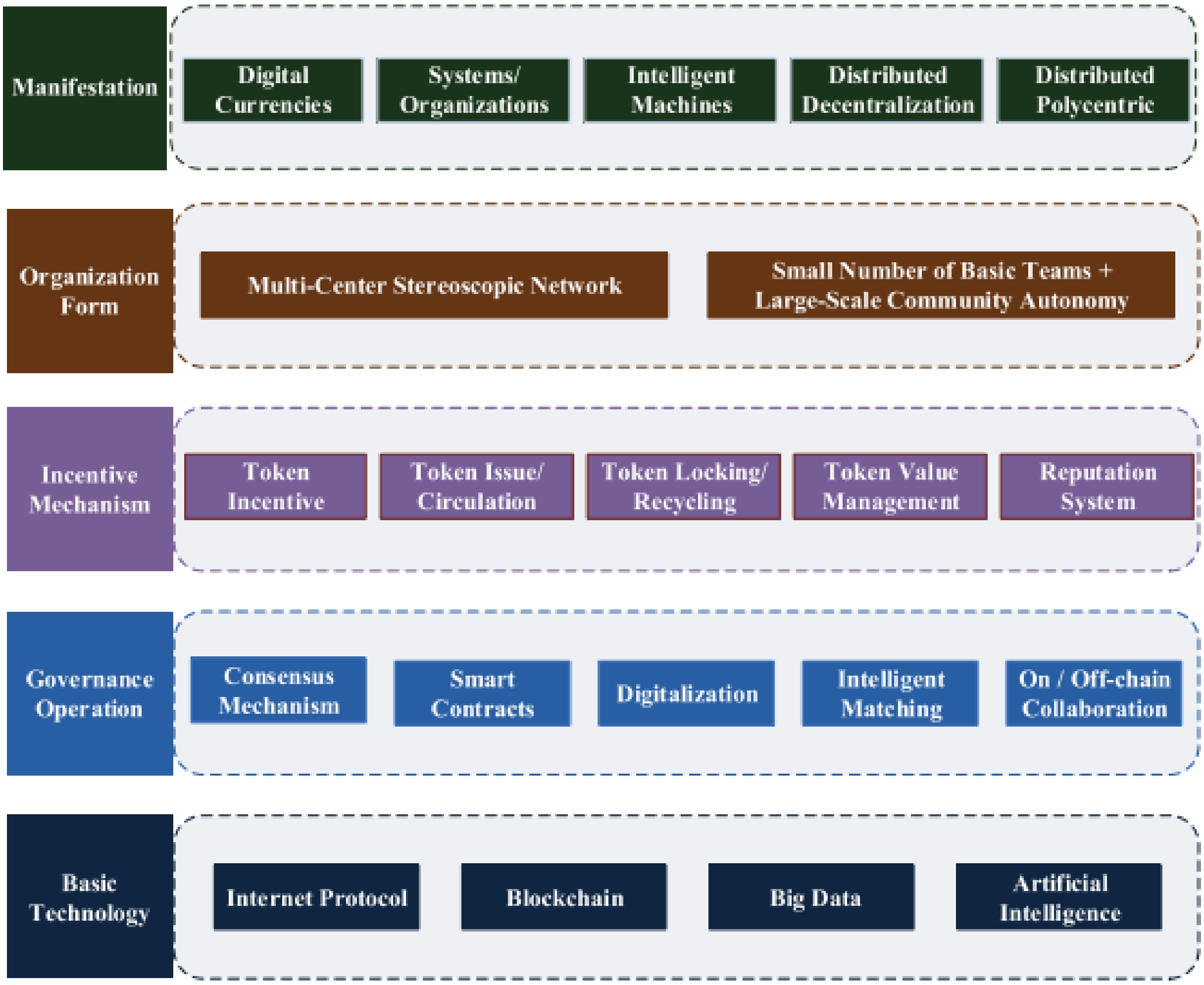

Figure 9 - DAO Reference Model (Wang, Ding, et al., 2019)

Collectively, the definition, three characteristics, and reference model support the understanding of the complex phenomena of DAO in a systematic and organized manner. The reference model is especially a great resource to unfold and address the building blocks of a DAO in the rest of this theoretical section and our DAO design proposition.

4.2.2 DAO types

DAOs are diverse and may take many forms and functions (Ziegler & Welpe, 2022). Nonetheless, Ziegler & Welpe (2022) identify five distinct DAO types to guide researchers and practitioners. Furthermore, they denote that in order for it to be considered a DAO, it must have a smart contract that operates the DAO treasury with public read rights and a governance token and voting process set in place (Ziegler & Welpe, 2022). The five types decompose DAOs in a more digestible way, which is useful for our analysis and likewise makes it more understandable to FTI and readers by having functional terms as reference.

Common for all of the five types is that voting power is determined by the number of tokens owned and that there are no limits on the voting power of the individual member, i.e., a token-based voting system. Furthermore, all DAO types are non-hierarchical, and members that own a token can participate in the voting process. Below we describe each of the types (Ziegler & Welpe, 2022).

1. On-chain product and service DAOs concerns building and managing products. Access is open, and "the business models of these DAOs are a service on the chain, which charges the user fees; and these fees are then used to increase the price of the governance token" (Ziegler & Welpe, 2022, p. 12). Similar to type 2, 3, and 4, proposal creation is restricted to members holding a certain number of tokens. Governance on this type is entirely on-chain (see 4.2.3.3).

2. Off-chain product and service DAOs with community focus is also open and concerned with building and managing products. Member incentive is to profit from the governance tokens, which is rewarded from contribution to the DAO. Tokens are distributed free to a set of users depending on the objective and strategy (airdrop). Governance decisions are exerted by multi-sig holders (a mechanism requiring multiple signatures from a group) governing the treasury. DAO likewise gets capital from its services and products.

3. Off-chain product and service DAOs with investor focus is similar to type 2. However, contributor rewards are typically other tokens such as stablecoins, and the distribution of tokens happens through sales, e.g., Initial Coin Offering (ICO), i.e., a fundraising method to raise capital through token sale to investors.

4. Investment-focused DAOs primary purpose is investing or fundraising; the member incentive is likewise to gain profit from the DAO token that increases in value "rises in price when the investment returns of the investments actioned by them through their governance process result" (Ziegler & Welpe, 2022, p. 13). The DAO treasury of this type is diversified beyond the native token. Similar to type 3, an initial token sale allocate the tokens distribution. (Ziegler & Welpe, 2022, p. 13)

5. Networking-focused community DAOs purpose is community building and engagement. Member incentive is to connect with the community that is gated by the tokens. As the only type, the governance process is not visible to the public, and access to proposal creation is by invitation only. Initial token distribution may either be through token sale or airdrop, and DAO capital gain comes from the sales of tokens.

4.2.3 DAO governance

The term *governance* stems from the Greek verb "kubernáo" which means "to steer" (Nigam et al., 2022). Broadly speaking, it is the act of decision-making, processes, and practices to oversee and control something in a specific direction (4.3). As outlined in Chapter 2, DAOs enable new forms of governance. Deciding on a governance system for a DAO is crucial as it "[…] will have material and potentially irreversible effects on an organization's potential, so DAO members must be diligent in choosing and maintaining an effective system." (Nigam et al., 2022, para 1). Despite this, frameworks for establishing effective governance and design structures in DAOs are scarce and instead redirected toward smart contracts at the code level. Smart contracts facilitate the governance of DAOs, but components such as incentive and governance mechanisms are likewise critical for establishing effective DAO governance. These components correspond to the reference model's governance operation- and incentive mechanism layer (Figure 9). Core governance components include token economy, voting, disputes, and on-chain versus off-chain governance (Nigam et al., 2022; Qin et al., 2023; Santana & Albareda, 2022; Strauf, 2022; Wang, Ding, et al., 2019), which we will cover going forward.

4.2.3.1 Tokenomics

The main motivator for DAO is the token incentive (Wang, Ding, et al., 2019). A token, in the context of blockchain, is a digital representation of an asset or utility, e.g., currencies (such as Bitcoin), commodities, and securities (Oliveira et al., 2018). Consequently, the emergence led to the term token economy and T*okenomics:* a portmanteau of "token" and "economics" that involves the study of digital tokens and economic behavior (Oliveira et al., 2018; Stevens, 2022; Wang, Ding, et al., 2019).

In DAOs, tokens typically represent ownership and voting rights, enabling the token holder to participate in the DAO governance. Additionally, tokens are also used as a means to raise funds (e.g., ICOs) and are part of the DAO treasury, meaning that it reflects the value of the DAO. In general, tokens often serve multiple purposes, but typical archetypes include equity, funding, consensus, work, voting, asset, and payment tokens (Oliveira et al., 2018). Since each DAO can issue its own native token, it can decide on relevant parameters for the token model, such as token supply, incentives of the token, circulation, etc. (Wang, Ding, et al., 2019). According to Wang, Ding, et al. (2019), "[…] a good token model integrates the monetary capital, human capital, and other capitals together, changes the relationship between people and organization, reduces the operation costs, and meanwhile satisfies the fund demand in the early stage of the project. "(p. 874). On the contrary, fruitful projects will increase the token's market value, thereby providing a great incentive for the members. There are several ways to go about designing the token and incentive mechanism; in fact, a DAO may decide not to have a native token but instead rely purely on a reputation system (Strauf, 2022; Wang, Ouyang, et al., 2019). Figure 10 exhibits a basic setup for a DAO from the outlook of Tokenomics (Strauf, 2022).

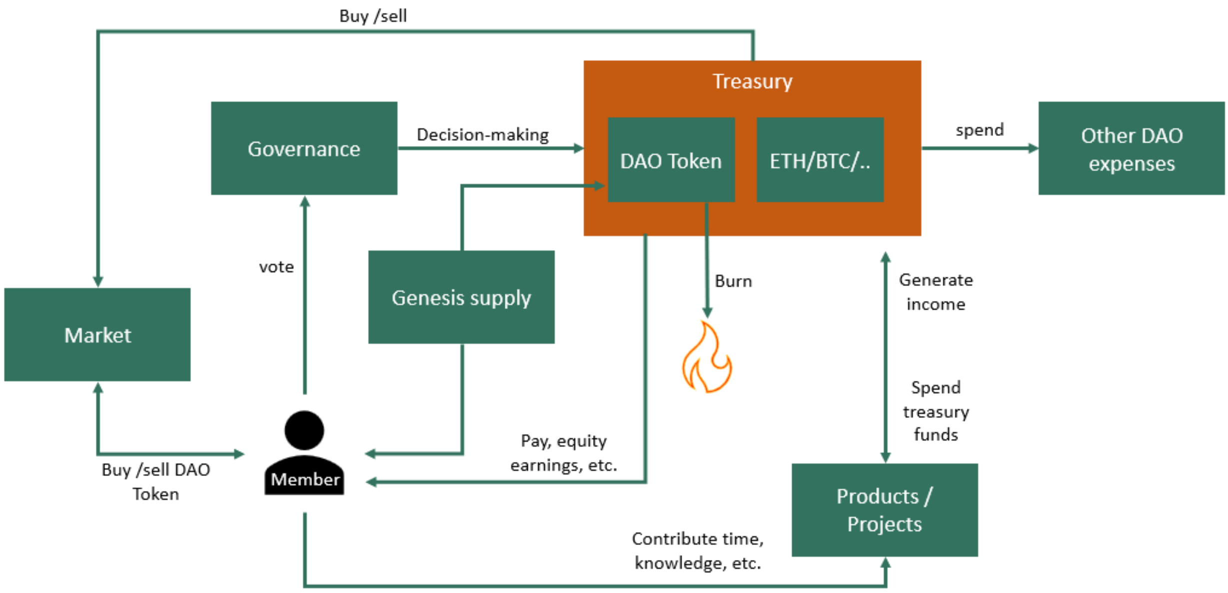

Figure 10 - Tokenomics - a basic setup for DAO adjusted model from (Strauf, 2022)

The member acquires the DAO token through either the Market or Genesis supply (initial token supply) that can be handed out in many ways, including as an ICO/ITO, to the founder team, early contributors, and more. Holding a token typically means that the member has the right to vote and participate in the governance of the DAO, including what the treasury should be used for. However, the specific rights may vary dramatically from DAO to DAO based on the rules (encoded in the smart contract). Moreover, the DAO generates income through its products and projects, which ultimately increases the value of the DAO Token and serves as an incentive for holding the token. Nevertheless, the DAO Token can also be used as a utility token to access a specific service or platform that would otherwise not be allowed without the token, hence a different incentive. Establishing the token incentive is essential, as also highlighted by Wang, Ding, et al. (2019) 's reference model. Furthermore, supply and demand are the most crucial consideration in Tokenomics (Strauf, 2022), which is echoed by the incentive mechanism layer in the reference model. For instance, founders of the DAO should consider how many tokens should be issued and the preferred circulation. Equally, this is affected by inflationary and deflationary Tokenomics to manipulate token circulation and token value management. For example, if the DAO wants to reduce its supply in circulation, it can employ deflation by *burning* tokens, which, all things equal, would increase scarcity and, thus, price. Burning is achieved by transferring tokens to a random uncontrolled address, typically done automatically by a smart contract once the circulation meets certain criteria. Binance does this regularly and recently burned $500M worth of tokens (Strauf, 2022).

The disadvantage is that token holders would trade less and transfer less utility. Therefore, these considerations have to be made in conjunction with the manifestation layer, i.e., the purpose and goal of the DAO, since the price and distribution of the token will, among other things, also influence the barriers to participation.

4.2.3.2 Voting systems

Contrary to traditional hierarchal management, DAOs realize its premise of decentralized governance through voting (Nigam et al., 2022; Qin et al., 2023). To put it briefly, voting is exercised by an initial proposal by an authorized DAO member (typically token holders) outlining a decision or action, e.g., changes to the project or allocation of funds. The proposal is then broadcast to the rest of the members, that can cast their vote (if authorized) within a certain voting period. Once the period has ended, the votes are evaluated against the thresholds set by the DAO (at least 30% of total votes has to be cast, etc.). If accepted, the DAO will execute the proposal or reject and disregard it if it fails to meet the criteria. If the voting is done on-chain (see next section), the entire proposal and voting history are visible to the members and possibly non-members on public blockchains (e.g., through deepdao.io).

Despite the somewhat simple process, Nigam et al. (2022) states that "developing an effective and equitable voting system is challenging given limited precedent and the need to balance the DAO's decentralization ethos with other important but seemingly conflicting goals like efficiency and scalability" (para 7). As a result, different voting systems have emerged from experimenting with various techniques (Nigam et al., 2022). We summarize some of the significant systems below:

Quorum-based token voting – This type of voting system requires a minimum quorum (threshold) of token holders to participate in the voting. As long as this quorum has been met, the proposal will be rejected or accepted based on the voting results. This system was adopted early due to its simplicity; however, it may produce a plutocracy problem in which the wealthiest token members may disproportionately determine the decision-making (Keršič et al., 2022; Nigam et al., 2022). Voter participation is another issue with this voting system, considering that poor participation or high quorum will impair decision-making.

Ranked Choice voting – Inspired by traditional political voting, this system provides various options to the proposal and iteratively eliminates those options with the least number of votes until an option receives more than 50 percent of the votes. This system is helpful in funneling community consensus but is also very complex and demanding (Nigam et al., 2022).

Quadratic voting – This system allows voters to express their preference towards a proposal by 'buying' more votes through their available tokens. Each vote increases quadratically, i.e., the cost of each incremental vote increases, thereby providing the rationale that the voter will only buy more votes if they are confident in the proposal. This type of system is commonly used (Qin et al., 2023) but may also introduce plutocracy problems and so-called Sybil attacks, i.e., where a member illegitimately claims multiple identities to manipulate the results (Newsome et al., 2004).

Delegated voting – In this type of system, voters can delegate their votes to delegates they see fit to represent their beliefs and make decisions on their behalf (Hall, 2022). Delegated voting is helpful for combatting voter apathy and low engagement but also substitutes those voters who do not possess the right knowledge about a given proposal, e.g., technical security aspects, thereby making it more efficient. This system is quite popular and used by major DAOs such as Aragon and MakerDAO (Nigam et al., 2022). Conversely, this system contributes to centralization of power among the selected delegates. Therefore, DAO members should hold the delegates closely accountable and employ tools to track their behavior and ensure proper coordination among electing delegates.

Reputation-weighted voting – Contrary to token-based or one-vote-one-member models, this system allocates voting power based on the members' reputation. There are various ways in which this kind of voting system can be set up and allow for the earning of reputation. Examples include that reputation is awarded by activity and contribution, e.g., voting or creating proposals. Furthermore, reputation may be proportionate to all members of the DAO, so if one member gains reputation, the other loses it (rep dilution) (Be, 2019). Also, since reputation can be minted into a non-transferable token, it makes it is useful in preventing Sybil attacks (Be, 2019). To avoid misconduct and malicious behavior of highly reputable members, other members may create proposals to rep slash, i.e., reduce someone else's reputation.

Nonetheless, when deciding on a voting system for a particular DAO, it is important to stress that the mentioned systems are not exhaustive and that there are nuances to each particular system of the respective DAO. Likewise, each voting system presents its own advantages and challenges that are important to consider. The most significant challenges include efficiency, voter apathy, concentration of voting power, legal challenges, and security (Nigam et al., 2022). For instance, consider an on-chain product and service DAO (see section 4.2.2) with the purpose of building a blockchain application that could enhance supply chain traceability. The supply chain ecosystem actors are diverse, and a quorum-based voting system might favor the wealthiest members fostering a plutocracy problem.

4.2.3.3 On-chain and off-chain governance

In traditional organizations, decision-making happens through formalities such as contracts and policies but also through the informal dynamics and social interactions between the organization's employees. Likewise, DAO adopts two collaborative governance mechanisms: *on-chain* and *off-chain* (Wang, Ding, et al., 2019). On-chain refers to "[…] rules and decision-making processes that have been encoded directly into the underlying infrastructure of a blockchain-based system" (Reijers et al., 2021, p. 822), and off-chain governance involves all other processes and decision-making that are not recorded on the blockchain. Consequently, on-chain governance imposes gas fees (transaction fees) that can prove to be rather expensive given a high number of voters or proposals. Therefore, many DAOs employ off-chain governance (e.g., on discussion forums and Discord servers) concerning non-critical decisions to benefit from time and cost-effectiveness. On-chain governance, on the other hand, is generally used for "[…] critical or high-risk proposals like parameter tweaking, smart contract upgrades, integrations with other protocols, and treasury management" (Nigam et al., 2022).

A popular on-chain governance model considered the standard for many is the COMP Governor Bravo by Compound which has been forked by many other protocols such as Uniswap (Collins, 2021; Parton, 2021). In Compound's case, the governance unit is strictly proposals containing executable code with adjustments to Compound protocol. The voting system is token-based, and the number of tokens determines power. Users, however, *must* decide to delegate to another address or self-delegate before their voting power can be utilized. Once a proposal is created (requires 1% of total tokens), it goes into a proposal delay for two days to allow for the delegation of tokens. Voting then takes place over three days and checks for a quorum threshold (Compound quorum is 4% of total tokens). If the proposal passes, it transitions into a *timelock* queue that delays code execution. This serves as a security measure by allowing voters to withdraw their votes if malicious intentions are detected, thereby only executing the proposal afterward (Parton, 2021). The COMP Governor Bravo is open source and flexible, allowing for different designs.

Regarding off-chain, discussion forums and communication tools such as Discord are popular. However, many DAOs also apply specialized governance tools such as Gnosis Safe or Snapshot (Collins, 2021; Nigam et al., 2022). These tools allow for off-chain voting without any gas fees and, through the use of an oracle or multi-sig, record those off-chain votes on-chain. Evidently, off-chain governance is subject to greater centralization and de-trust, given that it requires trusted third parties or trust in members to appropriately handle the given decisions. Many DAOs employ a hybrid approach by combining on-chain and off-chain governance to leverage the best of both worlds (Collins, 2021; Nigam et al., 2022; Qin et al., 2023).

To summarize, Tokenomics, voting systems, and on-chain and off-chain governance embody the core elements of deciding DAO governance. Consequently, the three are crucial elements that we will address in our analysis and design of DAO. Understanding each of them allows us to effectively choose the most effective design for governing an industry-wide blockchain solution in FTI, including the strength and weaknesses of each.

4.2.4 DAO frameworks

As previously mentioned, no unified one-size-fits-all framework exists for creating and effectively operating and governing a DAO. That said, anyone can create their own DAO by developing a composite of smart contracts and deploying them on a blockchain. Likewise, creating and operating a DAO can be divided into four steps as defined by (L. Liu et al., 2021): (1) Developing and deploying smart contracts according to predefined rules, (2) Handling the token issues (through ICO) at the initial financing stage, (3) At the end of the financing phase, a DAO starts running, (4) Proposals are made, and members can vote on them. In the last couple of years, new platforms have emerged to facilitate the creation of DAOs. These provide predefined templates, i.e., smart contracts with predefined logic and rules, interface, and tools relevant for getting started and managing a DAO in simple steps. The leading platforms are Aragon, DAOstack, and DAOhaus (Faqir-Rhazoui et al., 2021). Aragon is the largest and most active platform, with more than 5,000 DAOs created and 300,000 community members (Aragon, n.d.; Faqir-Rhazoui et al., 2021). The *Aragon App* offers a no-code solution and guides the user through a series of steps and questions required to launch and deploy the DAO. Additionally, the Aragon App is part of an ecosystem that allows users to add third-party applications and other plugins to the DAO (Aragon, n.d.). Likewise, Aragon also offers *Aragon OSx*, a protocol framework that allows for customizing your DAO through your own developed smart contracts. Most recently, Aragon and Polygon Labs (an L2 solution of Ethereum) initiated a collaboration to provide the possibility of deploying Aragon DAOs on Polygon, effectively lowering the gas fees and thus soothing voter apathy (Bannermanquist, 2023).

The four steps defined by L. Liu et al. (2021) are useful to apply in our analysis and design of DAO from a practical outlook that we may extend to FTI. Likewise, the Aragon platform is a useful resource for creating a DAO in a non-technical manner that may appeal to the audience of our research context.

4.2.5 DAO Summary

Decentralized Autonomous Organizations are a novel form of organization that enable new structures for how people collaborate. The rules and management of a DAO are encoded on the blockchain through smart contracts, allowing for autonomous operations and decentralized governance. This section defined DAO and its characteristics and provided a reference model to direct the research. It provided five distinct DAO types, detailed the significant components of DAO governance at the heart of a successful DAO, and described the practical steps and a helpful framework for launching a DAO. Collectively, this theoretical frame sets the stage for working with- and designing a DAO for FTI to govern an industry-wide blockchain solution.

4.3 Governance

In the previous DAO section, we introduced governance in a DAO context and how these governance design decisions are essential for the success of a DAO. Nevertheless, despite this vital element of DAO, no common framework or best practice design mechanisms for a DAO to control an industry-wide solution has been identified in our literature search. Therefore, we may draw on other governance theories to support the governance design. The term governance is seen in many contexts other than the design of the DAO, and they are not all similar.

In organizational settings, the term corporate governance is a newer well-established concept to describe one of two categories: (1) behavioral patterns of corporations measured by performance, efficiency, and treatment of shareholders and (2) the normative framework or the rules the firm operates under (Claessens, 2006). Platform governance is another description of governance akin to the governance described for DAOs. Platform governance focuses on how design decisions should be made to govern a platform effectively.

4.3.1 Agency

The existence of agency theory in corporate governance literature was especially highlighted in the paper by Jensen & Meckling (1976), *Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure*. Jensen & Meckling (1976) highlight how agency theory is grounded on an economic model of human behavior where individuals' behavior is assumed to be opportunistic and self-serving, mainly motivated by the opportunity to achieve personal goals. Agency theory often highlights agency relationships where contracts with one or more persons (principals) employ another person (agent) to perform a job or service on their (the principal's) behalf, with a certain degree of delegation of decision-making to the agent (Jensen & Meckling, 1976). In the paper by Jensen & Meckling (1976), they highlight several components relevant to agency theory, including the *principal-agent problem, information asymmetry, agency costs, moral hazard, alignment of incentives, embeddedness, opportunism, and monitoring*. Agency theory related to DAOs is also investigated by Boss & Sifat (2022) that have found that "DAO's inherent characteristics are theoretically capable of overcoming agency problems such as opportunism, distrust and misalignment of interests in a novel manner" (p. 2). However, we remain skeptical about this claim since it is theoretical and not from praxis. We assume there will still be some agency-related issues in a DAO, and therefore, we introduce agency theory to address potential issues of a DAO.

4.3.1.1 Agency Conflicts

A firm is based on a limited or unlimited contractual relationship between two interested parties, the so-called principal and the agent (Panda & Leepsa, 2017). "The principal is the person who owns the firm, while agents manage the business of the firm on behalf of the principal" (Panda & Leepsa, 2017, p. 79), this relation created conflicts due to opposing goals and interests. Nevertheless, with the evolution in the firm and time passing, agency problems have also expanded to cover *major and minor owners and owners and creditors relationships* (Panda & Leepsa, 2017).

Based on this evolution of the firm, economists and finance researchers have identified three distinct types of agency problems, as seen in Figure 11.

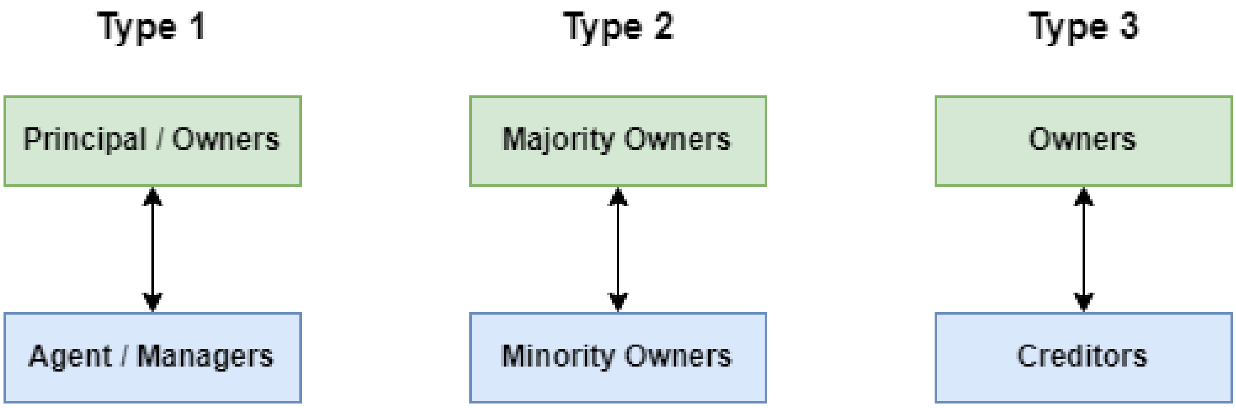

Figure 11 - Types of Agency Problems Adapted from (Panda & Leepsa, 2017)

Type 1: Principal-Agent: The first and most traditional type of problem defined by (Jensen & Meckling, 1976) is between the principal and agents. This arises due to aspects like information asymmetry and variances in risk-sharing attitudes (Panda & Leepsa, 2017). The misalignment between the two's interests and lack of monitoring due to dispersed ownership structures leads to conflicts which are known as principal-agent conflicts. These are seen in traditional centralized organizations where leadership teams might have different goals for the companies that are not well aligned with the typical employee. Therefore, it is necessary for a DAO design to focus on everyone's incentive to be aligned.

Type 2: Major and minor shareholders: The second type of problem defined by Gilson & Gordon (2003) is when major owners, defined as a person or group of persons holding a majority of the shares, make or block decisions with their higher voting power over minority owners. This can make it difficult for minor shareholders to protect their interests or wealth and can prevail in both countries, companies, and communities. This could present itself in a DAO context if big players were allowed to buy more tokens than others and, therefore, de facto, sit on the decisions right by themselves.

Type 3: Owners and creditors: The third type of agency problem defined by Muscarella & Damodaran (1997) defines how creditors wish to limit the risk that owners take due to the creditors having a limited potential profit. Where owners could achieve immense rewards by taking risks, but they could also default on the debt, and the creditors would end up with nothing. This should be avoidable in a DAO context due to the creditors also being owners but also having the possibility of voting rights, but it is an important aspect to keep in mind in the design of the DAO.

4.3.1.2 Information Asymmetry

Information asymmetry describes the situation where one party of a transaction possesses more or superior information than the other (Mishra et al., 1998). This results in one party achieving an advantage regarding access to information which can lead to a power imbalance between the parties. Information asymmetry can lead to outcomes that are not mutually beneficial and are seen in agency relationships or buyer-seller relationships. In academia, information asymmetry is often discussed in the context of markets and economic transactions (Mishra et al., 1998).

4.3.1.3 Agency Cost

The consequences of agency conflicts are the costs arising from it (Jensen & Meckling, 1976), and these costs cover the internal costs related to the misalignment of interests between two parties, i.e., agent and principal. Agency costs cover aspects such as acquiring a suitable agent, information gathering, monitoring, bonding costs, and loss related to inefficient decisions made by agents (Jensen & Meckling, 1976). Jensen & Meckling (1976) state that $Agency\ Costs = monitoring\ costs + bonding\ costs + residual\ loss$. *Monitoring costs* are costs involved in monitoring and assessing agents' performance. *Bonding costs* are the cost of set up and operating of close monitoring to align interests, and *residual cost* is the conflict of interest between shareholders and managers that results in decisions not aligned to maximize the wealth of owners.

Panda & Leepsa (2017) states that "agency theorists opine that good governance mechanisms can help in reducing the agency conflict" (p. 89). They further found that large board sizes reduce agency costs, independent board members positively affect agency costs, audit committees help in improving managers' efficiency and reducing agency costs, and lastly, found that the presence of remuneration and nomination committees positively affect agency costs (Panda & Leepsa, 2017).

4.3.1.4 Market Transparency, Moral Hazard, and Adverse Selection

Market transparency is considered a key mechanism to reduce the information asymmetry among market participants and, therefore, increase market efficiency (Bloomfield & O'Hara, 1999). Increased market transparency result in positive and negative effects, but "trade disclosure increases the informational efficiency of transaction prices, with prices converging faster in more transparent markets" (Bloomfield & O'Hara, 1999).

"Moral hazard refers to the problem of inducing agents to supply proper amounts of productive inputs when their actions cannot be observed and contracted for directly" (Holmstrom, 1982). Usually, moral hazard presents itself in insurance cases where a person or an entity won't bear the total cost of a risk and is therefore incentivized to increased exposure to risk or change of behavior.

Adverse selection refers to a situation where sellers have information that buyers do not have, which could be about product quality or production facilities, and therefore asymmetric information is being exploited. Adverse selection describes the phenomenon that people at higher risk are more prone to buying insurance than those at low risk (Wilson, 1989).

4.3.1.5 Summary Agency Theory

We will use the concept from Agency Theory, such as conflicts including principal agent and major and minor shareholder to better understand what potential issues could erode the DAO if they are not designed properly. We also seek to eliminate aspects such as adverse selection and moral hazard, and therefore it is important to understand these and figure out if companies could potentially exploit these aspects of the DAO.

4.3.2 Platform

In order to further understand how to design a DAO for the fashion- and textile industry, we draw on platform theory. We introduce platform theory due to the similarities in the literature between platforms, blockchain, and DAOs. Digital platforms are defined as "a digital space that provide facilities for users to collaborate, interact or transact digital" (Igi Global, n.d.) which strikes similarities to the definition of DAOs adopted in this thesis.

Both blockchain and DAOs have been identified and compared to traditional digital platforms (Sotatek, 2022; Toppin, 2022; Trabucchi et al., 2020). We will therefore elaborate on the definition of the two main types of platforms and discuss how openness and governance in platforms can impact DAO and blockchain's design and results. We will use these aspects in our analysis to see whether or not similar design choices are applicable in the DAO and whether they will have similar benefits or consequences.

4.3.2.1 Governance and openness in platforms

Parker et al. (2016) describe governance in platforms as having the goal of creating wealth and a fair distribution amongst all who add value. They state how traditional one-sided platforms have difficulty navigating governance rules and the necessity of platform managers to ensure that participants create value and resolve conflicts fairly and efficiently (Parker et al., 2016).

Platform governance is required because absolutely free markets are prone to experience failures, and by using essential tools for platform governance like laws, norms, architecture, and markets, platform managers can incentivize positive behavior and interactions (Parker et al., 2016).

The governance decision on whether or not a platform should be open or not is not binary and is a very complex spectrum, but the consequences of a wrong level in either direction are severe (Parker et al., 2016). This design decision is also one of the key design decisions in a DAO or a blockchain solution, and therefore, it is important to understand the benefits or consequences.

Openness in platforms does not have a set-in-stone definition but is categorized into two types by Parker et al. (2016),

> A platform is 'open' to the extent that (1) no restrictions are placed on participation in its development, commercialization (2) any restrictions—for example, requirements to conform with technical standards or pay licensing fees—are reasonable and non-discriminatory, that is, they are applied uniformly to all potential platform participants (p. 83).

The three main openness decisions faced by managers are manager/sponsor participation, developer participation, and user participation (Parker et al., 2016), which results in four main types of management and sponsorship of a platform *proprietary model, licensing model, joint venture model, and shared model.*

A part of the governance rules of a platform is also rules about who should be allowed to participate and engage on the platform (Parker et al., 2016). When platform managers control who participates on the platform, they can rely more on self-governance, which is crucial for effective platform management (Parker et al., 2016). "Well-run platforms govern their own activities following the principles of transparency and participation" (Parker et al., 2016, p. 112).

4.3.3 Governance summary

For a successful DAO and blockchain solution, many governance decisions will have to be made; therefore, this section outlined how agency aspects such as conflicts, information asymmetry, and others can impact how actors work together. We use these theories to design our DAO better because an erroneous design may produce fewer desirable outcomes, e.g., from moral hazard and information asymmetry. Secondly, we introduced platform theory since DAOs and blockchain both have been argued to be a type of platform. Platform theory outlines arguments for many of the decisions that have to be made on these two solutions, and therefore, we will use it as guidance.

4.4 Organization

To understand DAO design aspects, we introduce organizational theory to see whether or not the centuries of knowledge produced can be used in a DAO context. Traditional organizations have immense pools of knowledge for their design due to them being “complex systems” (Jensen & Meckling, 1976, p. 325). But as outlined previously, DAOs are a new form of organization, and they present their own set of challenges and complex decisions. As highlighted in Figure 5, this section will try to introduce the aspect of cooperativism, and co-opetition mostly applied to traditional organizations to see if the learnings from the two theories can be beneficial to DAOs.

4.4.1 Cooperatives

The earliest record of a cooperative was in 1761 and has since inspired the prototype of the modern cooperative society, considered founded by the Rochdale brothers (IcaCoop, 2023). The idea then led to the cooperative movement, which has a social and economic rationale (Andel, 2023; Andersen, 2018; Hansen, 2011). The social aspect is the desire and goal of creating equal and fair treatment of all members, and the economic rationale focuses on achieving economies of scale by collaborating rather than fully competing (Hildebrandt & Brandi, 2017).

The Rochdale brothers defined seven core principles and values for cooperatives which intended to keep the needs of the members first, those seven being: (1) Voluntary and Open Membership, (2) Democratic Member Control, (3) Member Economic Participation, (4) Autonomy and Independence, (5) Education, Training, and Information (6) Cooperation among Cooperatives and (7) Concern for Community (ICAcoop, n.d.)these principles have been adopted and extended with the most prominent being Scholz (2016) who created a set of ten principles of platform cooperatives which includes security, transparency and data portability, and the right to log off.

Literature highlights how cooperatives have two distinct sets of strategies for a cooperative to survive: business strategy and owner strategy (Hildebrandt & Brandi, 2017). The business strategy is like the one found in traditional firms, where the goals and objectives of the firm are defined and how they will achieve those goals (Hildebrandt & Brandi, 2017). Owner strategy focuses on protecting the participants involved in the cooperative and their purpose and ambition related to their participation (Hildebrandt

& Brandi, 2017). To define the owner strategy, one of the first things to figure out is whether or not the cooperative is an *input-* or an *output cooperative,* as seen in Figure 12 by Hildebrandt & Brandi (2017). The type of cooperative impacts what it means to participate in the cooperative; therefore, it is a crucial step for defining an owner strategy.

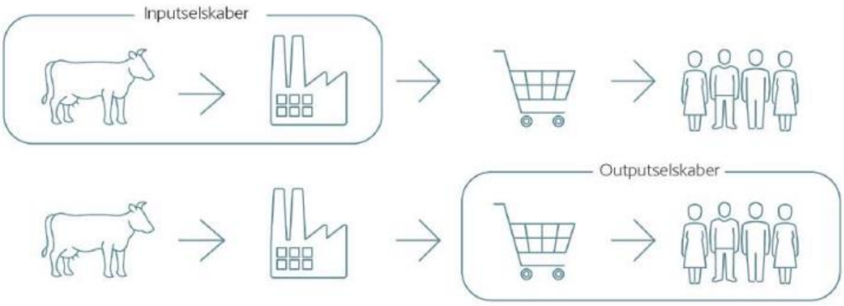

Figure 12 - Cooperative Type (Hildebrandt & Brandi, 2017)

In order to create a successful owner strategy, Hildebrandt & Brandi (2017) highlights five questions that should be asked in any cooperative to ensure a good owner strategy (1) why are we owners (cooperative owners)? (2) What do we wish to achieve with our ownership? (3) How do we contribute as owners? (4) How do we wish to lead and organize our ownership? (5) How do we wish to strengthen our ownership? (Hildebrandt & Brandi, 2017).

Hildebrandt & Brandi (2017) argues that for cooperatives to flourish in the next 100 years, they need to focus on the following: (1) digitalization, (2) globalization, (3) increase of fusions, (4) increased desire for transparency (5) development within corporate governance (Hildebrandt & Brandi, 2017)**.** While the new concept of platform cooperatives is tending to some of the issues defined by Hildebrandt & Brandi (2017) and paves the way for creating digital cooperatives, the digital cooperative still lacks aspect 4, the desire for transparency.

We will utilize the five questions Hildebrandt & Brandi (2017) presented to understand better the interview participants' goals and ambitions for participating in the DAO and see how these correlates with a DAO design. Additionally, we will explore how the seven core cooperativism principles will relate to DAOs and whether they can enhance a DAO.

4.4.2 Co-opetition

Co-opetition is a term expanded by Brandenburger & Nalebuff (1996), focusing on a new way of doing business. They believe businesses can become more competitive by cooperating rather than solely competing, hence the term co-opetition. Since their original book about the phenomenon, the practice has been adopted by many industry giants like Apple and Samsung, Google and Yahoo, Ford and GM, and many more have shown co-opetition elements (Brandenburger & Nalebuff, 2021).

Brandenburger & Nalebuff (1996) defines the *Value Net Model,* which outlines interdependencies between an organization and four other key players visualized in Figure 13.

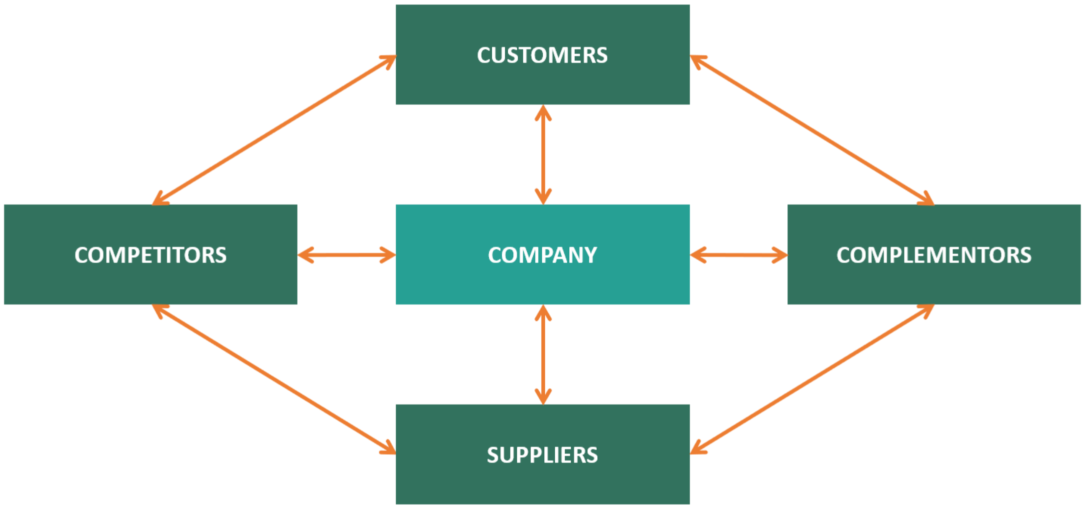

Figure 13 - Value Net Model (Brandenburger & Nalebuff, 1996)

Brandenburger & Nalebuff (1996) explains that the model shows how the interconnectedness of the market players can both be beneficial and hard to grasp. A company's customers can have other suppliers that could end up being beneficial to the company due to synergy effects for customers. Nalebuff & Brandenburger (1997) argues that complementors usually don't take care of themselves, and the synergies are often missing or too expensive or consuming, and to figure out if a player is a complementor or a competitor they state the following:

> A player is a *complementor* if customers value your product more when they have that player's product than when they have your product alone. A player is a *competitor* if customers value your product less when they have that players product than when they have your product alone. (Nalebuff & Brandenburger, 1997, p. 30).

Nalebuff & Brandenburger (1997) recommends three approaches that can be taken to solve a lack of complementors strategy, (1) do it yourself, (2) form an alliance or (3) set up a proprietary business. They further suggest using their Players, Added value, Rules, Tactics and Scope (PARTS) approach to shape the strategy required for successful co-opetition (Nalebuff & Brandenburger, 1997).

There are many proposed benefits from co-opetition, from the likes of sharing of strengths to fostering technological innovation, but it also produces potential drawbacks like lack of trust, antitrust issues, and power imbalances (Lutkevich, n.d.). The utilization of DAO in a co-opetition context is presumed to help participants collaborate while removing aspects like lack of trust and power imbalances assuming proper design choices. But with the utilization of aspects from co-opetition theory and examples, some of the common pitfalls found in this way of doing business should be preventable.

4.4.3 Organization summary

To better understand how to design a DAO, we have introduced different theoretical concepts, such as cooperativism and its core design principles, to see if they can apply to a DAO design. The questions for a cooperative owner strategy might be identical to those required for DAO participants. The aspect of co-opetition introduces the Value Net Model and PARTS approach that can help understand the requirements for the DAO design that companies will want and require in order to foster and desire growth and innovation.

5. Analysis

This chapter will follow the DSRM by Peffers et al. (2007) to create an artifact in the form of an industry-DAO Core Design Framework (industry-DAO CDF) for the fashion and textile industry (FTI). Before entering the first iteration, we identify the problem that the artifact seeks to solve. We then initiate the different iterations which constitutes our final industry-DAO CDF.

5.1 Problem Identification

Throughout our literature review and exploratory participation in two FTI workshops, we identified some of the problems and issues faced by the FTI. Both literature and the workshop pointed toward the acute requirement of change and innovation within the FTI to meet new regulatory standards required to operate in Europe. The European Commission launched its new strategy for sustainable and circular textiles (European Commission, 2022), an addition to its green transition efforts that is part of a bigger move towards a more circular economy, with certain regulatory changes already being imposed in 2025. The goal for the strategy is for all textile products sold in the EU to last longer, be reusable, free of dangerous chemicals, higher degree of traceability, and higher transparency regarding aspects such as social standards in production (BlockchainBusiness, 2023).

Therefore, the FTI has to support traceability and transparency data not previously captured to remain compliant and to continue their business. Most top brands are set to have 100% sustainable fibers by 2025, but 95% of the industry has limited to no visibility across supply chain tiers (Gautam, 2020). Moreover, the technological capabilities to solve these challenges are still not fully invented or standardized, so all actors scramble to find a solution and tries to force multiple different systems on vendors and sub-vendors. This creates an even more complex supply chain management task and multiple systems to operate and maintain. Due to this dispersed landscape of solutions, the industry is trying to identify a platform that can both accommodate the requirements of regulation and provide a standard piece of technology they could all benefit from and use. This is also the reason they chose to participate in industry workshops with universities to learn how blockchain could be the technology to provide this kind of solution.

The common opinion in the workshop was that they all saw tremendous potential in blockchain, but a few issues was contionously brought up, they lack resources, both monetary and capabilities, BaaS[3]

[3] Blockchain as a Service

either does not exist or the value proposition of them is not understandable or good enough, and they do not know how or where to start. Tripathi et al., 2021; Badhwar et al., 2023, and Agrawal et al., 2018 further support this, stating that some of the most notable challenges are the technical requirements for first-time participants and many unknowns due to low technological maturity. Nevertheless, the technology also proposes new alternative aspects of value creation, with literature postulating that it could improve many areas and enable a modern way of conducting business digitally.

To help the industry obtain experience and test hypotheses, CBS and Lifestyle & Design Cluster collaborated to create an MVP solution for a blockchain supply chain application that could work as an entry-level industry-wide solution. The FTI described the solution as valuable, and the participants extracted significant value from the solution (Appendix D – Workshop2). However, when the research project at CBS ended, no one could take over the operational aspects, and the solution ultimately ended up being discontinued, and all data on the solution was lost (Appendix C – GreenCotton).

This experience left some participants to question the viability of blockchain, and researchers in the project started speculating how the issue of ownership in blockchain solutions could be solved. This was at a time when industry giants such as Mærsk and IBM, as previously mentioned, failed with TradeLens, suspected to be due to concerns about centralized ownership. While centralized ownership solves most concerns regarding discontinuance and provides a center of knowledge and capabilities, it does pose questions about the viability of the solution as an industry-wide solution that keeps all participants' interests at heart. This is where the concept of DAOs came into the project, and it was questioned whether or not a DAO structured in a specific way could help establish, flourish, and operate an industry-wide blockchain solution. However, the literature fails to define an industry-wide DAO solution or any related useful design framework to create such a DAO.

In summary, the FTI faces immense regulatory changes and challenges and must innovate quickly to ensure business continuity in Europe. Therefore, researchers and industry actors propose examining blockchain solutions to comply with the new data requirements, but the knowledge in adopting blockchain is not prevalent, and research on industry-wide solutions is only starting to pop up.

Furthermore, certain previous large-scale blockchain systems have proposedly failed due to governing issues, so a solution to those potential problems in terms of a DAO needs to be understood. DAOs have only recently entered the research domain, but no research on the application of DAO as an industry-wide blockchain solution governing tool exists, so, therefore, the core design requirements need to be established.

Key problems

1. It is challenging for companies to comprehend and adopt blockchain in their business models.
2. The fashion and textile industry has poor clarity and no guidelines on how to establish an industry-wide blockchain solution
3. DAO is notoriously difficult to understand due to its abstract nature and recent inception
4. No design framework or guidelines exist for facilitating a DAO to govern an industry-wide blockchain solution.

5.2 Iteration 1

This section provides a detailed account of the first DSRM iteration of creating our IS artifact. We address the objective of the solution, design, and development of the artifact, and lastly, demonstration and evaluation of our initial artifact using a subject matter expert.

5.2.1 Objective of Solution

This iteration aims to address the first two key problems by enhancing clarity around the blockchain in the FTI and the business value it brings. In parallel, we aim to provide concrete suggestions to the FTI on key design considerations for an industry-wide blockchain solution to strengthen FTI decision-making and enable action. Doing so, we form the basis of the industry-DAO by creating the charateristics of the industry-wide blockchain solution that it has been proposed to manage. Consequently, the objective of this iteration is not to provide a comprehensive and technical solution but rather to provide overarching suggestions for critical considerations relevant to the FTI blockchain solution, in which we source our industry-DAO CDF. We base the suggestions on established theories outlined in Chapter 4 and the collected empirical data from our interviews and workshops.

We summarize our key solutions objectives below:

1. Present arguments for an industry-wide blockchain solution and thereby provide clarity and support decision-making in adopting blockchain.
2. Provide suggestions for imperative design considerations of an industry-wide blockchain solution for FTI.

5.2.2 Design and Development

In this section, we design and develop suggestions for a blockchain solution to support our final IS artifact. We review four crucial design considerations for an industry-wide blockchain solution and provide concrete suggestions for each. This provides a solid knowledge base for the FTI and enables the blockchain solution required to design the industry-DAO CDF.

To design an overarching design of an industry-wide blockchain solution for FTI, we draw on learnings from other enterprise blockchain applications (2.3) in conjunction with our theoretical framework. However, to guide a distinctive structure, we employ and extend the six recommendations from Lacity & Van Hoek (2021) in their study of Walmart's application of blockchain-enabled DL Freight. We do this because the case exhibited significant business value for Walmart and its 70 third-party freight carriers, and the recommendations touch on many of the overarching aspects related to adopting blockchain. We translate the recommendations and theoretical knowledge into four considerations: *Assess the Business Value and Consider the Underlying Processes*, *Blockchain Type*, *PoC or Pilot*, and *Market Approach*. By addressing each of these, we endeavor to satisfy our objective of providing arguments and clarity for an industry-wide blockchain solution and provide concrete suggestions for important design considerations.

5.2.2.1 Assess the Business Value and Consider the Underlying Processes

To assess the business value provided by utilizing blockchain in an industry-wide solution, we draw on Lacity & Van Hoek's (2021) first recommendation:

> [...] the business opportunity for interfirm process innovation must be large enough to compensate for the money, time and risks involved in building and maintaining an ecosystem-level solution. If the pain points are significant for all trading partners, then a potential use case for developing a solution exists. (p. 230)

So according to the first recommendation by Lacity & Van Hoek (2021), there are two points to judge the business value on, (1) the opportunity for interfirm process innovation must exceed the necessary resource requirements for building and maintaining it, and (2) these significant pain points must impact all trading partners.

Through literature and interviews with actors in the FTI, we identified that all actors in this industry face the pain point of traceability and transparency requirements to continue operating within Europe. BESTSELLER implies this by stating, "We do get requests about this information[traceability] from our customers, but it is our wholesale customers who are also facing these regulative requirements"

(Appendix C – BESTSELLER, 04:25). Researchers are in unison about the viability and ability of blockchain to meet the demands of all actors in the industry that try to capture and ensure the legitimacy of this never before captured data throughout their supply chain. The general opinion found in our literature review was the possibility of blockchain solving the supply chain management (SCM) challenges of providing traceability and transparency, which the FTI industry desperately needs. This perception is also shared by the industry actors in our interviews, as seen in Table 4.

Table 4 - FTI Participants' Opinions on Blockchain in the FTI

Statement	**Company**	**Time**
"I don't think it [blockchain] provides value any many other places than supply chain"	BESTSELLER	11:10
"Maybe as a supply chain management tool, but not as a marketing thing"	GreenCotton	40:00
"where I see the biggest benefit of blockchain is if we do a fiber forward tracing approach"	GANNI	09:37
"It is about creating a fast belief about the transparency" and "down the road we see it useful for regulative and legal requirements in regards to the digital product passport and ESG requirements" and "And it is clear, that when it comes to traceability and blockchain it just fits really well together".	SPOOR	00:53; 03:38; 18:56

There are also additional ways that increased use of blockchain in SCM could derive value. One is the ability to accurately capture post-sale information and enable a potential new business model with a focus on the circular economy. For instance, BESTSELLER states, "[…] when we are in control of our stuff, it could be exciting to read the [blockchain] data at the customers and at one point measure how many of the goods we sell, come back or get recycled" (Appendix C – BESTSELLER, 12:48).

A blockchain SCM could also save costs by limiting information asymmetry and decreasing search costs for retailers and suppliers. While research does mention the high cost associated with blockchain (Tripathi et al., 2021, Badhwar et al., 2023; Agrawal et al., 2018), those costs are most often associated with the implementation or cost already incurred by an existing system, and not the long-term cost of a blockchain solution.

While SCM management was the most researched area of application in research and the most mentioned viable area by industry actors, research also highlighted many different areas of potential business value. It could eliminate the double spending problem, which was also highlighted by SPOOR "With blockchain, we could figure out who in the chain has found more product than we delivered"

(Appendix C – SPOOR, 12:03). Companies could also realize increased quality management and time and cost-efficiency throughout their supply chain (Badhwar et al., 2023) and many other areas such as increased sustainability and better product authenticity as highlighted in our literature review.

Where SCM, in the context of the FTI, has to be understood further is within the recommendation by Lacity & Van Hoek (2021) to consider reengineering the root cause. Currently, in the FTI, there are numerous different certifications that one brand can pursue to show their consumers the quality or sustainability of their products, one of them being the GOTS (Global Organic Textile Standard). GreenCotton focuses on complying with GOTS labeling, which requires them to put data into their specific system, and during their PoC of blockchain, they were required to use two different systems because GOTS did not take blockchain data as eligible transparency data (Appendix C – GreenCotton). When asked if TextileGenesis data was considered eligible for EU compliance, BESTSELLER stated, "I actually do not know that. That is a super good question which I would expect them to be on top of, but it's a super good question because I do not know" (Appendix C – BESTSELLER, 11:51). So, the systems used, and reporting requirements are not standardized yet, and if the industry keeps using an abundance of systems, it might not be possible to reengineer the root cause. Therefore, the FTI should aim to push the certification issuers and regulators to standardize their requirements for data sources and data types to create a more straightforward landscape for the FTI actors, leading to better transparency for consumers.

The pains and business opportunities highlighted by Lacity and Van Hoek (2021) are perceived as present, but the interview participants still agreed about the difficulty of embarking on the blockchain journey. Companies such as Samsøe & Samsøe stated, "We see massive value in blockchain technology, but we do not know how and where to start, there are so many new providers, and it is hard to differentiate them" (Appendix D - Workshop 2). Moretto & Macchion (2022) also supports this by stating that blockchain is ideal for companies with a high need for traceability, but the investment requirements are too big for those who do not have the data or capabilities already. This was also experienced by GreenCotton, saying that they tried to "[…] find a solution together for this, but it would be […] a lot of money each month for each of us" (Appendix C – GreenCotton, 40:47).

However, one aspect of an SCM blockchain solution is also the importance of all supply chain links participating in the solution. SPOOR said that "if only 20% of the supply chain wishes to participate, you can forget all about it" (Appendix C – SPOOR, 09:20). So, while the companies and literature identify heaps of untapped value ripe for a blockchain solution, the industry is full of small-scale adoptions, with own developed solutions that are only used with specific sub-vendors or suppliers (TFL, 2018), especially seen in the luxury supply chains. Therefore, additional value arises from utilizing a standardized system that was also supported by SPOOR, saying that "[…] it's a disadvantage [for blockchain] when you're required to join a new blockchain for each new supplier or retailer" (Appendix C – SPOOR, 14:03). GANNI likewise states that blockchain should help "getting away from the data silos that we have in the industry" (Appendix C – GANNI, 20:26).

A SCM blockchain solution is very susceptible to network effects, as in Platform Theory, where more actors create positive network effects and incentivize others to join. However, the adverse is also true in that fewer actors can result in even fewer actors joining, and the value enabled by blockchain could cease to exist. Therefore, we argue that the value of blockchain is not derived merely from implementation but by multiple actors adopting an industry standard or a specific industry-wide supply chain management blockchain solution. By an industry-wide supply chain blockchain solution (ISCM blockchain solution), we refer to a technological application based on blockchain technology, enabling a shared ledger for actors in FTI to trace their respective goods throughout their supply chain. Further, this would break down the siloes of various solutions and enable greater efficiency.

Ultimately, this thesis suggests adopting an industry-wide standard or even a single solution. This would allow all actors to extract the values enabled by the blockchain without worrying about compatibility and enable lower barriers to participation, reduce costs, and fulfill the new regulatory requirements for the FTI.

5.2.2.2 Blockchain Type

Before deciding on the blockchain type, reflecting on whether the abovementioned business value indeed requires blockchain technology or a traditional solution is constructive. GANNI, for instance, stated that "since [they] are not a tech company but a fashion company, blockchain is not so relevant as in knowing it's a blockchain, it's more just about the functionality and that it works for us, but it doesn't matter if it's a blockchain or if it's a cloud system" (Appendix C – GANNI, 00:21). Equivalently, the third recommendation by Lacity & Van Hoek (2021) involves assessing if the business value can be realized as effectively without blockchain technology. Naturally, blockchain may not be necessary for situations where transactions merely require a single party to write or where all writers are entirely trusted. Nonetheless, the business case for an ISCM blockchain solution involves, as the name imply, transactions among countless untrusted heterogeneous actors, translating into a good use case for blockchain technology. This was also reflected by, e.g., BESTSELLER and GANNI, that said that they typically do not know or interact with all their supply chain links (Appendix C – GANNI; BESTSELLER).

As listed in section 4.1.2, this thesis identified four potential blockchain types: (1) Public, (2) Private, (3) Consortium, and (4) Hybrid. A common denominator for the FTI companies was data concerns. Given that the applications pertain to the supply chain, multiple actors will require certain interfirm read and write access that may pose compliance issues and cause confidential business information to be exposed. Additionally, the industry-wide property produces another layer of complexity by imposing vertical, horizontal, and cross boundaries to be exposed. In other words, the specific solution will comprise an entire ecosystem of manifold competitors, affiliates, partners, etc., where the value and risk come from the network.

One example is GreenCotton which states, "We have names that we won't want to go out. But I think also for […] our value chain, maybe there will be a knitter somewhere that [our suppliers] wouldn't like us to know who they bought the cotton from." (Appendix C – GreenCotton, 58:00). Similar data concerns were raised throughout Workshop 2, e.g., SAMSE & SAMSØE recognized the potential business value in sharing "generic data" but apprehensive of sharing any sensitive data. The empirical findings from Workshop 2 and interviews regarding data generally correlate with literature findings and recommendations. For instance, Lacity (2022) states that "Enterprises need confidentiality, not anonymity, and must comply with regulations, including KYC, AML, and General Data Protection Regulation (EU GDPR). Many enterprises want to control who submits transactions and who is allowed to operate a validator node" (p. 329).

Theoretically, this contravenes the public blockchain as a suitable type, as the default characteristic is complete transparency and providing everyone with access- and validation rights. Public blockchains embody a high degree of openness confer platform theory that, in turn, increases governance complexity but simultaneously nurtures network effects. Furthermore, an industry-wide solution (let alone a supply chain management) consists of multiple heterogenous actors where most are competitors and assumingly, from an agency lens, behave opportunistic and self-serving. Therefore, a private blockchain can also be disregarded to avoid having one entity controlling the entire blockchain. A hybrid blockchain could be a possible solution due to its flexibility in design, however, the complexity can be very high.

Alternatively, a consortium type blockchain (private permissioned) seems to be the most suitable type. This allows for polycentric management, i.e., a consortium of FTI companies, in which multiple selected nodes operate the consensus mechanism creating a semi-decentralized ledger, higher level of trust, and immutability. Furthermore, consortium blockchains utilize permissioned protocols requiring an invitation to participate in the network and may further restrict access and validation rights. To summarize, a consortium blockchain in this specific context offers three key advantages over traditional systems:

Increased trust – Nodes are known but not trusted. No single organization can manipulate the data; instead, the distributed and semi-decentralized (vary by number of nodes) ledger ensures immutability and integrity from its consensus algorithm.

Transparency and traceability – Generally, involved parties can read and audit the respective transaction history while using mechanisms such as encryption and channels to ensure data privacy.

Improved efficiency – Utilizing smart contracts, the parties can automate and streamline processes without manual intervention inherent from its code-is-law principle and the abovementioned advantages.

Even though consortium blockchains are theoretically suitable for enterprise ecosystem applications, they can be cumbersome to set up and deploy because it requires a significant level of cooperation between the FTI companies (Wegrzyn & Wang, 2021). A possible solution for addressing this challenge is using a well-designed DAO, which we will discuss later.

5.2.2.3 Decide where to start: PoC or Production Pilot

The third consideration follows the fifth recommendation by Lacity & Van Hoek (2021), i.e., whether to initiate with a Proof of Concept (PoC) or a Production Pilot. The authors argue that the decision should be based on the participants' previous experience with blockchain. Moreover, Lacity & Van Hoek (2021) state that while 84% of PoCs never leave the sandbox, they may still provide valuable learnings.

To suggest where the FTI should start, we employ the four typical stages of enterprise blockchain projects identified by Rauchs et al. (2019). In Figure 14, we summarize the progression of the four companies interviewed and our understanding of the average progression of the other companies present at Workshops 1 & 2. BESTSELLER has by far the most progression and is currently running round three of its pilot with TextileGenesis (Appendix C – BESTSELLER). GANNI has done two POCs that were close to pilots, but one of them transitioned into a cloud platform (Appendix C – GANNI). Lastly, SPOOR and GreenCotton have both used the blockchain solution provided by the previous research project at CBS (Appendix C).

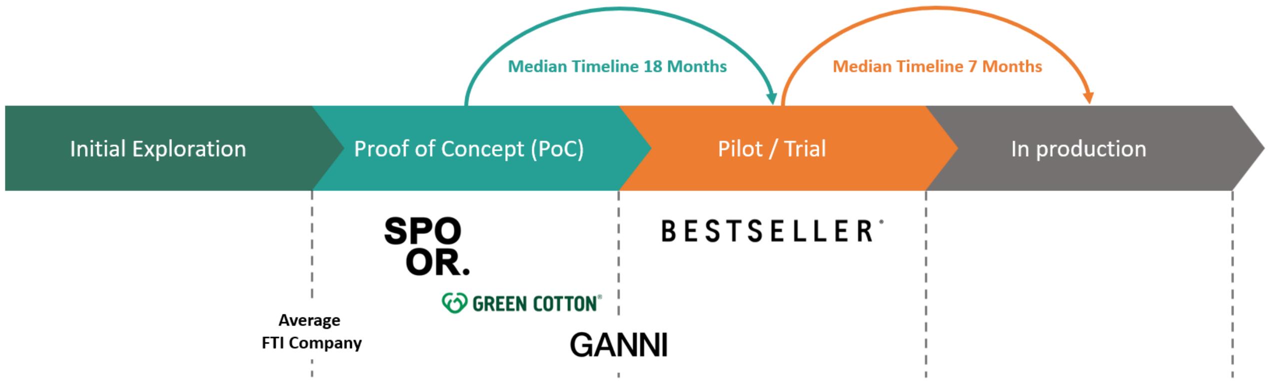

Figure 14 - Enterprise blockchain projects adapted and expanded by (Rauchs et al., 2019)

Figure 14 shows that the average maturity is dispersed, but none of the companies have progressed past the Pilot/Trial stage. Even companies such as Nike or H&M, which are giant international industry players that, have progressed further than BESTSELLER, but are still not in production (Appendix C - BESTSELLER, 36:57). Interestingly, Figure 14 is also a reflection of the company size, with the revenue of the companies increasing along the same axis as progression in their blockchain journey. Most of the companies interviewed had experience with blockchain to a certain extent, but companies participating in the workshop were not as far on average. They faced challenges such as where and how to start and a lack of resources (Appendix D - Workshop 2).

Based solely on the companies we have interviewed, this thesis would suggest that they start with a pilot/trial. However, when looking at the broader picture, our data foundation is insufficient to warrant such a suggestion, and since an industry-wide solution does not exist currently, we suggest doing a PoC instead. This is a low-risk and cost-effective start that allows testing the feasibility of an industry-wide solution and is a valuable start to accelerate learning, engage key stakeholders, and generate interest beyond the founder consortia.

5.2.2.4 Market Approach

The last consideration derives from the fourth and sixth recommendations by Lacity & Van Hoek (2021). This involves whether the FTI should create a custom network, configure a new one based on an existing platform, or join an existing network; and whether they should manage the blockchain themselves or buy it as a service. We translate this into market approach.

At present, this thesis did not identify any existing industry-wide networks, so joining an existing network is not an option. Although TextileGenesis is offering its solution to many parties, it is unclear if they qualify as an existing network (see Appendix B for a project explanation). We attempted to contact TextileGenesis to understand the functional details of the traceability platform but did not receive any response. From this thesis' point of view, we regard TextileGenesis as a configurable platform based on our readings and understanding of the platform. For instance, BESTSELLER and H&M each use TextileGenesis but are configured explicitly to their supply chain partners and requirements, thereby creating siloes. Theoretically, however, we assume that it is possible to leverage TextileGenesis to establish an industry-wide solution, given that all industry actors operate the same network.

The remainder is thus to decide whether to develop a custom network or configure an existing one and decide whether to manage itself or buy it as a service. From our empirical data, there seems to be harmony around utilizing a technology service provider (TSP) to provide a configurable platform and operate the network. GANNI, GreenCotton, SPOOR, and most participants in the workshops all recognized their limited IT capabilities and preference towards using a TSP, e.g., GANNI states that

> "[…] in terms of technical and digital capabilities within a fashion company, I think it is the easiest for us to just tap into third party platform providers, […] we just buy into it and they deliver us a solution that helps us trace our products." (Appendix C – GANNI, 17:16).

Even though BESTSELLER has a dedicated IT department and would potentially be able to develop their own custom solution, they still decided to engage in various pilots using TextileGenesis (Appendix C - BESTSELLER). The BESTSELLER representative stated that they did conduct a solution assessment with multiple providers. However, she was not part of this and could not detail why TextileGenesis was chosen specifically (Appendix C – BESTSELLER, 25:43). We may, however, assume that they were chosen on merits or capabilities such as, costs, and ease of experimentation.

From our literature review, we also derived that most enterprise applications partner with TSPs, to configure and operate the blockchain solution. While there are nuances to the role of the TSPs, it implicitly contradicts the blockchain properties by adding a neutral authority to, e.g., operate nodes and enforce governance. Ideally, the nodes in the consortium network should be operated by the various FTI participants to harvest trustlessness. Having a single entity operating the nodes likewise creates risk-dependency issues, which was also the case with GreenCotton's PoC with CBS, where all data was lost and left unutilized once the network operator left when the project ended. Subsequently, GreenCotton's takeaway was that they "[…] do not want some big player to own all our value chain data and put it all on a server in India or something like that" (Appendix C – GreenCotton, 48:35). The risk-dependency concern was also raised by multiple participants from Workshop 2, stating that they do not want to participate in an industry solution where one industry giant controls the blockchain and they thereby become vulnerable. In other words, this can translate to the classical dilemma of putting all eggs in one basket or creating a big hen.

Based on our empirical data and findings from the literature, we propose that FTI should partner with a TSP but manage governance-related aspects of the blockchain themselves. However, the FTI may configure or create a custom network. We summarize the two options below in Figure 15 and briefly list the advantages and disadvantages of each.

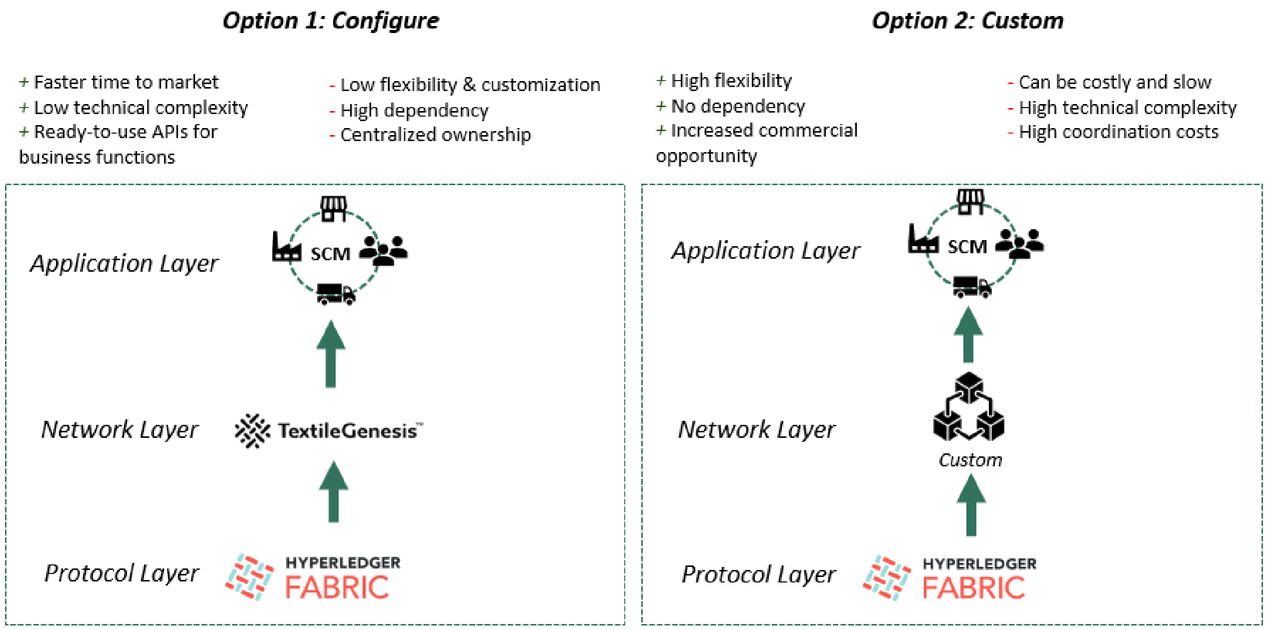

Figure 15 - Recommended options based on the Mental-Layer model (Own Creation)

First and foremost, we propose that the blockchain solution is based on the Hyperledger Fabric protocol as this is the most widely used protocol for blockchain enterprises networks (Rauchs et al., 2019) and has been used in sizeable projects such as TradeLens, Walmart Canada, IBM Foodtrust, and more. The protocol is highly modular, supports a consortium-type architecture, and flexible approach to data privacy through "channels" while accommodating the diversity of enterprise use cases (Hyperledger Fabric, n.d.). That said, it is worth noting that the suggestion of using Hyperledger Fabric is not technically positioned but based on the assumption that its popularity indicates a suitable protocol.

Secondly, we remain agnostic as to whether the FTI should configure or create a custom network. There are several reasons for this. As shown in Figure 15, configuring a network based on an existing platform such as TextileGenesis decreases time to market, reduces technological complexity while validating the overarching business case, and accelerates learning of their PoC. On the contrary, this may put the FTI in a position where they rely on platform providers such as TextileGenesis, which leaves little control over the platform and decreases the possibility of innovating further and leveraging the technology in other areas (technical and commercial). It also remains unclear if TextileGenesis would be operating the nodes and thereby technically have the ability to alter data without the need for consensus. Such technicality will thus also have to be considered in the final decision of the market approach. Creating a custom network provides additional flexibility in technical and commercial architecture and allows for becoming pioneers, which may yield first-mover advantages. Additionally, it provides FTI with influence and control but would likewise add a higher complexity of cooperation between the FTI actors and impose higher technical complexity and costs.

Lastly, the data derived from the network should be utilized appropriately at the application layer to create and capture business value. Since the solution would regard the FTI, the application layer must accommodate various business functions and systems. TextileGenesis, for instance, already has business applications in place, such as a mobile app for end-consumers, traceability standards, and allow easy integration with other IT systems for supply chain partners (Ahmed & MacCarthy, 2021). Once more, however, the offerings may not be exhaustive, so additional custom functions at the application layer could be beneficial. Generally, though, the application layer concerns supply chain management, particularly transparency and traceability, but also to enhance and minimize waste business processes; for instance, having two retailers leverage one process to fetch data regarding products from the same supplier, optimizing efficiency.

5.2.2.5 Summary of blockchain considerations

To summarize, this thesis elaborated on the business value of blockchain in SCM for the FTI. Specifically, we argued that an SCM blockchain has a significant value alone, but current market adoptions do not adequately capture said value. We argue that capturing all value proposed by a blockchain SCM solution would require breaking down data silos and establishing an ISCM blockchain solution to provide a standard solution for all retailers, suppliers, vendors, and customers to reside. Additionally, in consideration of the business value, we argue that in the aspect of reengineering the underlying process, it would be beneficial for the industry to make certification issuers and regulators standardize the data requirements to enable more resources used on improving the aspects sought to be improved rather than to invest in compliance.

In our second consideration, we suggested that the ISCM blockchain solution be designed as a consortium. Mainly, this allows for the distribution of nodes operating the consensus mechanism, increasing trust between the network compared to a private blockchain where one entity rules it all and makes it easier to accommodate data privacy and compliance concerns raised by the FTI companies.

Thirdly, while most of the FTI companies from our interviews have somewhat progressed with blockchain technology, we find that the average company in FTI still lags behind. Also, since there have been no concrete initiatives towards an industry-wide solution, we suggest that the FTI initiate with a PoC to validate the feasibility and accumulate learnings.

Lastly, based on our empirical findings and literature, we suggest that the FTI companies partner up with a technology service provider (TSP) to develop and maintain technical aspects of the solutions (e.g., software updates). However, we stress that FTI companies should operate the network nodes and control everything governance-related, including deciding on features and driving consensus mechanisms. We provide two options with benefits and drawbacks, as presented in Figure 15, in relation to configuring or creating a custom network. We will leave that decision to the FTI companies as there are uncertainties around a configuration's technical aspects, which first will need to be clarified in conjunction with the TSP partner.

Overall, this serves as a good knowledge base for the FTI to leverage when deciding on overarching design-related aspects. That said, there are still numerous choices and critical questions ahead, such as how do we coordinate around creating and managing such a solution? Consequently, this marks the DAO portion, which can be leveraged to facilitate the effective enablement of an ISCM blockchain solution, which will discuss in the next iteration.

5.2.3 Demonstration

To evaluate the first iteration of the thesis, we will introduce a new interview participant to evaluate our findings. The search for subject matter experts (SME) to conduct this evaluation led to two employees in Deloitte Denmark, a blockchain researcher from Australia, three FTI actors, and one from the Danish Design Cluster. However, due to scheduling constraints, we only interviewed one employee from Deloitte Denmark, experienced in the FTI and especially in the blockchain domain, with six years of professional experience helping enterprises utilize blockchain. The Deloitte employee (DE) will be the only SME to evaluate this iteration.

In our interview with the DE, we started setting the scene for our research and established a shared understanding of what we would present and would like to receive feedback on. To obtain feedback on our suggestions for blockchain design considerations, we asked the DE relevant questions and presented him with the various options and thoughts behind them. Throughout, he gave his personal and professional opinion and likewise referenced his current and former research to challenge our suggestions with technical arguments. After the presentations of our considerations, we discussed the industry's future, where he felt there were missing aspects, and provided his take on the next steps.

Our ultimate IS artifact will be the industry-DAO CDF, but due to the creation process, it has not yet sufficiently manifested itself, and therefore our IS artifact for this iteration was simply a set of design considerations discussed in the interview. Therefore, this evaluation will be used to further conceptualize the IS artifact in the next iteration.

5.2.4 Evaluation

The following section describes the evaluation of the blockchain design recommendations and overall DAO comprising our IS artifact. We begin with the blockchain design recommendations according to the four considerations mentioned in the previous section and then continue to the DAO evaluation.

5.2.4.1 Blockchain Design Considerations

Assess the Business Value and Consider the Underlying Processes - Generally, the DE agreed with our claim that blockchain has excellent value potential in the FTI and particularly supply chain management. He acknowledged that an industry-wide solution would potentially increase value by, e.g., creating data standards and reducing associated costs with having multiple systems, as he also thinks that the FTI is "[…] in an environment where we have many actors, we have low transparency and low trust, in a supply chain that is" (Appendix C – Deloitte1, 14:16).

Blockchain Type – Secondly, this thesis proposes a consortium blockchain type (private permissioned) for the FTI in an SCM context. However, the DE quickly dismissed that, stating that private permissioned blockchains do not solve coordination issues as well as public blockchains do (Appendix C – Deloitte1). Secondly, our argument for a private blockchain is to account for the required privacy and compliance issues the FTI faces. However, the DE clearly stated that

> "This assumption was valid at first, but now the technology has evolved so it can make sense to […] apply this, and there exist ways in which you just hash some parts of your data and puts it on a public chain and thereby get this, that is using a byzantine fault tolerance consensus mechanism, to get this coordination without one or more actors can go together and thereby control the networks truth direction" (Appendix C – Deloitte1, 11:34)

From the interview, he also highlights that a public blockchain is more valuable if the FTI were to use TSPs that built applications akin to SaaS solutions on top of the public blockchain infrastructure that would possibly facilitate more business cases, e.g., on top of the Ethereum ecosystem (Appendix C – Deloitte1)

PoC or Pilot - Thirdly, in our suggestion for the FTI to start with a Proof of Concept (PoC), the DE says, "That I disagree with […] if the blockchain is merely a technical exercise, then you have already lost" (Appendix C – Deloitte1, 30:38). Moreover, he argues that most PoC's (particularly those done on Hyperledger Fabric) never reach production or scale (Appendix C – Deloitte1)

Market Approach - The DE partly agrees with our recommendations for the last consideration. He agrees with our recommendation to partner with a TSP to configure or create a blockchain network.

Additionally, he agrees with our recommendation that the FTI should operate the network and consensus mechanism, saying, “I think it is fine […] you can operate a network, and that you should not give the software provider too much power, and that I totally agree with” (Appendix C – Deloitte1, 35:16).

However, our recommendation of utilizing Hyperledger Fabric as a protocol and TextileGenesis as a configurable platform (Option 1) was far from his recommendation (Figure 15; Appendix C – Deloitte1). He reasons that Hyperledger Fabric fails to solve the coordination problem compared to public blockchain infrastructures like Ethereum and continues contending the scalability of Hyperledger Fabric:

> “Despite Hyperledger Fabric on paper should be faster and better than some of the others [blockchains] that are more secure or at least have security that can handle adverse actors, then it does not even perform as good [as other blockchains]” (Appendix C – Deloitte1, 15:48)

In terms of using TextileGenesis, as a recommended option for this thesis, the DE speculates on the blockchain integrity of the platform, saying that Deloitte “cannot find any evidence that this model [TextileGenesis] should be a distributed database” (Appendix C – Deloitte1, 21:22). He furthermore implies that using TextileGenesis will impose an all egg in a basket issue for the FTI, leaving little control for them. Ultimately however, the DE states that he does not believe that the FTI is facing a technical challenge, but rather one of governance and collaboration. (Appendix C – Deloitte1, 30:38; 32:55).

5.2.4.2 DAO Feedback

After the DE highlighted that it was a collaboration challenge that the FTI was facing, we went to talk about the topic of DAO and received his feedback on our preliminary thoughts on a DAO for the FTI based on the initial feedback from the interview participants.

The DE stated, “I feel like it [a DAO] has potential, and on-chain governance is interesting – especially if you are in an industry where you are not used to collaboration and if there is already mistrust” (Appendix C – Deloitte1, 18:52). He also focused on the fact that a DAO can enable transparency by tracking what people vote on and in general on-chain aspects creates transparency as well as power distribution aspects through voting design (Appendix C – Deloitte1, 19:10). We shared our findings from BESTSELLER, and the fact that they hoped that TextileGenesis would be eligible as compliance data. The DE responded by stating that especially areas like this are where “[…] you can argue that having a DAO consistent of members from the Danish textile industry makes sense” (Appendix C – Deloitte1, 21:56) to ensure that not every company would answer ‘I hope so’ about compliance. The DE highlighted:

> “It is not a competitive parameter, it is a **necessity**, it is not a competitive advantage, it is a competitive **necessity”** (Appendix C – Deloitte1, 22:35).

He elaborates further by stating that in an industry where everyone has to do something e.g., comply with regulation, they might as well share the costs associated with the requirements (Appendix C – Deloitte1, 22:35).

But he does not believe that a DAO had to be accompanied or even only responsible for a ISCM blockchain solution, supported by "[…] it [a DAO] does not necessarily have to own a software [blockchain] solution" (Appendix C – Deloitte1, 22:50). The DE highlights the importance of the FTI to decide what they need and why they need it. Otherwise, micro decisions will result in macro results, with more actors looking at TextileGenesis as the TSP because of other FTI actors adopting them. The FTI they could end up ultimately making TextileGenesis *the* blockchain TSP in the industry, simply because of the number of companies using them. The DE argues that this is an issue because it would provide them with too much power and limit further innovation in the blockchain realm (Appendix C – Deloitte1). Therefore, he reiterates that it is not technical help that the FTI needs, even though they may state otherwise, they need help to facilitate collaboration to define what the industry needs and how to make it happen (Appendix C – Deloitte1).

Ultimately we have adopted a new perspective of the value proposition proposed by the DAO, initially we had seen the DAO as a technical tool that could manage development, management and governance of an industry-wide blockchain solution. But the DE proposes a different value proposition for the DAO, with the DAO beign a good tool for the FTI "I think doing it it [fashion industry collaboration tool] with a DAO is a really good way of doing it" (Appendix C – Deloitte1, 28:04) with a focus on collaboration, not technology.

5.3 Iteration 2

This section is the second iteration of the DSRM. We start by revisiting the solution objective and continue designing and developing our artifact, which we then demonstrate and evaluate using SME.

5.3.1 Objectives of Solution

To evalute iteration 1, we had an informative evaluation with the Deloitte employee (DE) regarding our blockchain recommendations and a discussion around a DAO in the FTI. The DE stated that it was a fallacy to believe that creating an industry-wide blockchain solution for the FTI was ultimately a technical challenge and that the challenge ahead was with the governance design required to enable collaboration amongst untrusting industry actors. Therefore, we deem that the concrete blockchain proposal presented in iteration 1 might not be required to conceptualize a valuable DAO for the FTI.

Based on this opinion from the DE combined with our own findings from literature and interviews, we challenged our preconceived notion of the requirement for a well-defined blockchain solution as a success criterion for a DAO in the FTI. Therefore, we have decided to amend our perceived value proposition of a DAO in the FTI. Specifically, we will now focus more on using a DAO as a new governance and collaboration tool to help create trust and establish the understanding and requirements needed for a potential industry-wide blockchain solution.

Consequently, this iteration aims to define relevant categories comprising the core design of a DAO useful for the FTI to enable the new value proposition of a DAO. Alongside this, our endeavor is also to provide clarity on the components comprising a DAO and provide insights into otherwise lacking topics. We aim to do this by drawing on our theoretical frameworks and interpretations of our empirical data. We summarize the differentiation below:

- **Pre**: Use a DAO to develop, manage, and govern a shared blockchain solution based on the recommendations from iteration 1 and subsequently design the DAO based on this.
- **Post**: Use a DAO as a new governance and collaborative tool with the initial purpose of setting the requirements for a potential shared blockchain solution and facilitate trust in an untrusted industry.

Key solution objectives:

1. Define influential core design categories of a DAO
2. Identify the benefits of a DAO for the FTI
3. Provide concrete recommendations for utilizing a DAO in the FTI based on the core design categories

5.3.2 Design and Development

This section will describe and develop the suggestions required to construct our industry-DAO CDF. To produce our industry-DAO CDF relevant to the FTI, we draw on all theories introduced in Chapter 4, the literature identified in Chapter 2, and collected data from our interviews and workshop observations following the methodology of Chapter 3.

In reaching our solution objectives, we are inspired by cooperativism and particularly its core design principles, given that we and the literature highlight the resemblance between cooperativism and DAOs and possible synergetic effects. Moreover, we argue that the concept of ownership strategy, i.e., the owner's – the cooperative members' – purpose and ambition for joint ownership, by Hildebrandt & Brandi (2017), applies to many of the components surrounding DAOs. The inspiration and utilization of cooperativism concepts are not to say that we believe that a DAO is a modern cooperative, but simply that many of the design factors are deemed similar in research, and we believe that many of the learnings from cooperatives are transferable to the design of DAOs.

Ultimately, all the aspects from the preceding work of the thesis cumulate into what we define as an industry-DAO Core Design Framework (industry-DAO CDF). We define *industry-DAO* as a DAO that comprises an entire industry and, in this case, the entire fashion- and textile industry. Seven core design categories conceptualize the industry-DAO CDF that we believe are integral for any industry-DAO. The seven core design categories are (1) *Purpose*, (2) *Membership*, (3) *Form*, *Roles*, *and Structures*, (4) *Tokenomics*, (5) *Voting Systems*, (6) *Accountability and Conflicts*, and (7) *Operations*.

We will discuss each of these core design categories and provide concrete recommendations in each for the FTI. Throughout, we seek to distinguish the level of DAO maturity into so-called phase 1 and phase 2 when providing concrete suggestions. Phase 1 represents the industry-DAO's genesis and embodies its new purpose and, thus, design. We regard phase 2 as a point in which the industry-DAO has launched its blockchain solution and reached a certain amount of critical mass. Although we mainly focus our attention on phase 1, we believe it is helpful for the FTI by providing considerations as to how the design could potentially develop in phase 2.

5.3.2.1 Purpose

The first category of the industry-DAO CDF is to define the purpose of the DAO. This category derives from our theoretical framework, e.g., the manifestation layer from Wang, Ding, et al. (2019)'s reference model and the DAO types proposed by Ziegler & Welpe (2022).

This thesis will conceptualize an initial purpose inferred from our research on the topic. However, it is important to stress that this is an initial purpose for phase 1, and we strongly suggest that it be re-visited in or before phase 2 to ensure it continues to align with existing and new members. We define the industry-DAO's purpose as a collaborative forum in which the FTI develops a business strategy and establishes the best market approach related to a blockchain solution to solve regulatory requirements imposed on the industry. This involves selecting an appropriate technology service provider (TSP) that could either develop a custom or configurable solution to comply with requirements set by the DAO. Based on the defined purpose, we argue the type of the industry-DAO aligns with that of an on-chain product and service DAO; however, extended with a community and networking focus since the product emerges from the industry collaboration (section 4.1.2). In defining the purpose, we also identified a set of benefits the FTI could achieve in phase 1 using a DAO seen in Figure 16.

Figure 16 - Benefits of using a DAO (Own Creation)

Facilitate trust amongst untrusted actors - The first benefit is the associated trust that the DAO enables with unknown actors, supported by the Deloitte employee stating that using a DAO to establish transparency and trust in the FTI is a promising approach (Appendix C – Deloitte1, 18:52). Which is supported by literature stating that a DAO can limit or remove principal-agent conflicts (Boss & Sifat, 2022), which would reduce costs such as bargaining costs for FTI actors. The DAO providing increased transparency also solves the issue that the cooperativism business model is facing now and within the next 100 years, according to Hildebrandt & Brandi (2017). If the FTI were to adopt something akin to a platform cooperative, we argue that it would not as easily solve the issue of requiring increased transparency for the cooperativism business model to continue to flourish.

Democratic decision making - A DAO creates a forum where every actor in the FTI could be equal depending on the governance design covered later in the industry-DAO CDF. Nevertheless, a democratic voting system is possible to implement in a DAO which would enable all actors in the FTI to have their opinion heard, both in terms of collaborative aspects and if the DAO was used for proposals towards legislators. BESTSELLER stated that they did not believe that the industry would evolve if the FTI did not work inter-organizational (Appendix C –BESTSELLER, 21:12), but other companies interviewed were scared of being overruled in a partnership with companies such as BESTSELLER if they were to collaborate; therefore, a democratic system will be beneficial for the entire FTI. The second principle of cooperativism is also to have democratic member control, where the members are actively setting policies and making decisions for the cooperative (IcaCoop, n.d.).

Enable new complementary relations - A DAO can also help establish a complementor strategy for FTI actors. Brandenburger & Nalebuff (2021) state that forming an alliance is a way of solving a lack of complementor strategy, which enables additional value for customers. Forming an alliance with a DAO introduces transparency and limits information asymmetry, and therefore the difficulty of structuring agreements when conducting co-opetition, highlighted by Brandenburger & Nalebuff (2021), should be reduced.

Self-coordination and self-governance – Since a DAO is built on smart contracts, it enables members to create transparent autonomous agreements that minimize aspects such as policing and enforcement costs. The DAO would also follow the fourth principle of cooperativism, with the aspect of the DAO remaining autonomous and interdependent. However, within this benefit, there is also an aspect of scalability issues, i.e., when more members join, the decision-making process could become inefficient. We propose relevant design considerations in this respect in voting systems category.

Shared mission and vision – We conceptualize the initial purpose of the DAO in this thesis, but with the maturity of the DAO, the FTI actors could adapt and adjust the purpose to align more closely with the opinion of the collective. Nevertheless, with the purpose being clear and membership being voluntary, it would create a group of like-minded individuals that all work towards a shared goal, with the possibility of defining the path ahead of them for further maturity of the industry-DAO.

Fair share of risk and benefits – Introducing an industry-DAO could save the FTI actors money or resources and capture new value, supported by co-opetition theory and the interview with the DE. Co-opetiton theory is built around the value creation achieved through collaboration between competitors, with the authors stating: "At the simplest level, it can be a way to save costs and avoid duplication of effort." (Brandenburger & Nalebuff, 2021, para. 3). Brandenburger & Nalebuff (2021) states that co-opetition is often something companies refrain from in concerns that it could remove their competitive advantage but provides the example of Amazon allowing rivals to sell on their site, to keep them away from competitors and capture some profit from them. This would mean that actors such as BESTSELLER are still incentivized to join, capture new value or split the costs of embarking on a new project. The DE supports that the DAO could save the FTI actor's resources by stating, "for all the areas where there are competitive necessities, we [the FTI] might as well share the costs and build the competencies" (Appendix C –Deloitte1, 21:56).

5.3.2.2 Membership

The membership category derives from multiple theories and the fact that calibrating the right level of openness is, according to Parker et al. (2016), one of the most challenging and critical decisions to make in a platform governance context. Like cooperativism, no DAO can succeed without dedicated and participating members; in essence, it is an object of its participant's activity, and therefore it is vital to define and control membership decisions in the DAO. Therefore, we will propose two questions that will define the membership design of the industry-DAO: What is the purpose of the membership (incentive), and secondly, who is allowed to be members of the DAO?

Defining the purpose of membership is challenging and will largely be an actor-dependent decision based on what they perceive the value to be. Nevertheless, it is an important aspect, also highlighted by Hildebrandt & Brandi (2017), where two of their ownership questions required for a strong ownership strategy is related to membership, the first being "Why are we owners?" and the second, "What do we wish to achieve with our ownership?". While we cannot provide a definitive answer for the individual FTI actor regarding their incentive to join the DAO, we can communciate a set of reasons that could help a potential member make their decision. Which we had to do in our interview with SPOOR when they asked, "What should our motivation be to join it [the DAO]?" (Appendix C – SPOOR, 26:28). We identify four reasons why joining the DAO during phase one could be valuable. The first is that the DAO enables inter-organizational collaboration and knowledge sharing to help in a fast-paced regulatory environment. Supported by co-opetition theory based on inter-organizational collaboration increasing potential value in a market (Brandenburger & Nalebuff, 2021) and the Deloitte employee stating the DAO as an ideal tool for knowledge sharing and collaboration in the FTI industry impacted by low trust (Appendix C –Deloitte1, 21:56). The second reason is the reason of membership due to socio- and economic rationale from cooperativism, the DAO would enable economies of scale for all members, both in terms of monetary aspects but also knowledge creation. The third reason would be joining a forum that could help establish and provide actors in the FTI a tool that is a competitive necessity due to regulation through the limitation of agency-related conflicts due to the transparency of information (Appendix C –Deloitte1, 21:56). The fourth and final reason would be to influence the direction of the blockchain solution pursued by the DAO, from day one. Phase 2 of membership would largely be identical to the first, but two new reasons for membership could be the introduction of monetary incentives or the access right to the underlying blockchain solution if industry-DAO membership were required to use it.

The second question of membership considerations in the industry-DAO would be who is allowed to obtain membership of the DAO. This aspect will, in all likelihood, change over time, but there are theoretical considerations on that we will base our suggestion, which is seen in Table 5, that outlines the arguments favoring or against open membership in the industry-DAO.

Table 5 - Overview of Arguments for DAO membership design

Theory	**Arguments**
Cooperativism	Principle 1 of cooperativism states 'open and voluntary membership' but also the possibility to impose limitation by "the purpose of the cooperative" (IcaCoop, n.d., p. 6).
Platform theory	Argues that a more open platform is harder to self-govern and that the decision of openness is among the most complex design considerations for a collaborative platform (Parker et al., 2016).
Output or Input Cooperatives	Hildebrandt & Brandi (2017) argue that the ownership strategy is difficult to align due to the drastic difference in output and input cooperatives business strategy.
Co-opetition	Brandenburger & Nalebuff (2021) state that collaboration between suppliers, customers, competitors and complementors increases the potential value being capturable in the market.
Network Effects	Network effects describe the concept that the more members participating, the more value is created for new members, and therefore more will join.
Interview Data	GANNI stated that finding "[…] the best possible solution for our suppliers because the less platforms that the industry uses, the less platforms our suppliers have to use" (Appendix C –GANNI, 20:26). BESTSELLER also stated that they could see the benefit of having many eyes on a specific topic and that it could help remove potential bias' when they heard from other parties (Appendix C –BESTSELLER, 32:56).

Table 5 highlights relevant arguments for and against an open membership design for the industry-DAO. We argue that phase 1 of the industry-DAO should remain open for anyone from the FTI wishing to participate in what we define as the founder team. The founder team consists of companies that wish to solve compliance issues by utilizing blockchain and either wants to commit capital or time to move closer to the possible solution as fast as possible. While Hildebrandt & Brandi (2017) argues that output (retailers) and input (suppliers or manufacturers) are difficult to have in the same cooperative due to differences in business strategy, we argue that it is different in a DAO context. A DAO's importance on the success of the business for FTI actors is not the same as cooperative-company's dependencies on the success of a cooperative due to their intertwinement. A DAO is more akin to participation in a voluntary industry association that could leave your business better off and help it flourish, but it is not the main enabler of success. We argue that the network effects obtainable with the 7.200 companies found in the FTI sector in Denmark (Erhvervsministeriet, 2020) and the vast number of suppliers outside Denmark will, especially in the context of the underlying blockchain solution, provide large amounts of untapped value and potential savings; under the assumption that the aspect of co-opetition, and alignment of industry actors (both output and input) is upheld. All members are imposed by a set of rules or predetermined list of responsibilities which could ultimately discontinue their membership of the DAO. In the second phase of the industry-DAO CDF, the same membership rules will remain unless the participants experience issues due to the open membership rule.

5.3.2.3 Form, Roles, and Structures

The third category of the industry-DAO CDF is inspired by the organizational form aspect in the DAO reference model by Wang, Ding, et al. (2019) and by Hildebrandt & Brandi (2017)'s documentation of the structure of traditional cooperatives and their layers of power, as well as their fourth question to strengthen the ownership strategy being "How do we wish to lead and organize our ownership?".

During phase 1 of the industry-DAO, we recommend operating with a completely decentralized and flat organizational structure to enable equal rights and possibilities within the DAO. This is also elaborated upon in Tokenomics and voting systems, where the design of the form is further cemented. We also suggest that the industry-DAO introduces a so-called governance facilitator in phase 2, tasked with assisting members in navigating the governance processes of the DAO, inspired by MakerDAO (Appendix E). Other types of member roles throughout the maturity of the DAO, or in phase 2 could be examples such as subject matter experts in either technical, ESG, or regulatory domains. This would help the other members of the industry-DAO to ensure that they are basing their decisions on factual and current information.

In order to create a new or reframe an existing company structure Hildebrandt & Brandi (2017), we adopt two of their aspects, transparency, and scalability. The aspect of **transparency** is vital in cooperatives to understand and showcase the democratic governance process in the cooperative (IcaCoop, n.d.). But due to the inherent nature of DAO introducing transparency by design, this is not deemed as a relevant issue. DAO is only considered a DAO if it has a smart contract that operates the treasure with public read rights. Ultimately, a DAO will remain almost entirely transparent if all DAO-related activities remain on-chain.

The aspect of **scalability** was also a concern raised by BESTSELLER, stating that "the fewer involved, the faster the decision-making process" (Appendix C –BESTSELLER, 33:24) and therefore, once the DAO gets to phase 2, it has to be able to scale adequately and have decisions made speedily to support the increase of participants. There are two ways in a DAO context to help ensure this: introducing a delegated voting system, which we will touch upon in voting systems, and the introduction of subDAOs. SubDAOs are defined as the DAO equivalent of traditional companies adding new departments, business verticals, or teams to their organization; the subDAO still operates with complete autonomy but remains aligned with the main DAO (Bankless, 2022). If subDAOs were to be used, they could help ensure the scalability of the DAO by making sure that decision-making is not halted due to many actors wanting to vote on specific matters; a subDAO could represent many actors' interests.

Ultimately, it will be hard to predict how the structure and the constellation of the DAO and possible subDAOs will form. It is also important to highlight that it is hard to predefine a correct way of organizing the structure and form; this is also known from cooperativism, where they state that "Each co-operative will need to structure its own democratic governance and bylaws to be fit for purpose" (IcaCoop, n.d., p. 17).

5.3.2.4 Tokenomics

The fourth core design category that we regard as imperative in an industry-DAO is Tokenomics. This category derives from our theoretical framework and relates to the incentive mechanism from the reference model by Wang, Ding, et al. (2019). As explained in section 4.2.3.1, Tokenomics is essential to manage because it interconnects all DAO-related aspects, e.g., incentivizing participation in a DAO, facilitating governance, value management, and DAO capital.

In an industry-DAO whose purpose is product building and management, a token could represent the product's inherent value or serve as a utility token to gain access to the product. Likewise, if the industry-DAO wants to raise funds from its members or investors through a token sale (e.g., ICO), it is essential to consider the token distribution and value concerning investor incentives. Generally speaking, native DAO tokens primarily represent ownership and provide voting rights to the token holder. A thoughtless approach to Tokenomics could be detrimental to the success of the DAO

Consequently, the Tokenomics for FTI's industry-DAO should correlate with its integrity, including voting systems, participation, purpose, and more. While Tokenomics could be a thesis in itself, we try to address three main subsets that we consider fundamental for any DAO.

- How do we distribute the initial native tokens, and what is the token's utility?
- How does the DAO gain capital?
- How does the token contribute to the purpose of the DAO and its projects?

Initial token distribution – The industry-DAO for the FTI differs from most other DAOs and DAO-types, e.g., MakerDAO, which we perceive as a pure on-chain and product service DAO. On the other hand, the FTI industry-DAO also lends properties from other types, such as community and networking. The initial token distribution and subsequent circulation will affect the value and utility (e.g., voting power), e.g., tokens could be diluted due to a token supply increase. That said, based on the initial purpose of the DAO, we suggest airdropping (free distribution) the tokens equally to the founder team to onset a democratic voting power (similar to off-chain product and service DAOs with community focus). The native token will initially serve as a governance and equity token representing voting power, a share of the DAO, and potentially a share of the blockchain solution. In phase 2, the token could also serve as an asset-backed token that provides access to the blockchain solution once developed. Consequently, the token represents the underlying value of the DAO treasury and the blockchain solution, which creates a possibility of monetary incentives for members. The initial token distribution can also be distributed through a token sale (e.g., ICO), but we argue that this could present an early undesirable plutocracy problem in which the wealthiest members can buy voting power which may increase entry barriers.

Capital gain – Based on the purpose defined in 5.3.2.1, the industry-DAO would not require any immediate capital in its initial launch besides contributing with time, knowledge, and possibly modest administrative costs. This also corresponds with the preferences highlighted by some FTI actors, stating that they favor investing time in the beginning rather than money (Appendix C –GreenCotton). Although the members are free to inject capital into the DAO however they like, they should do so with terms that align with all members, e.g., token rewards. Costs may arise in the endeavor to find a suitable strategic TSP partner and costs associated with paying for the development of the solution itself. For this purpose, the industry-DAO is required to raise capital to cover the costs. This can be done in several ways, including minting more tokens to increase supply and selling those to possible investors or additional FTI actors, selling off their own, or injecting capital themselves (e.g., donation or investment). However, we want to stress the importance of not surrendering their democratic control, as highlighted by the fourth cooperativism principle (Autonomy and Independence). Being overruled by large giants was also something the small-medium-sized FTI actors raised as a concern (Appendix C). To utilize the code-is-law property and prevent hostile takeovers, the Industry-DAO may employ a cap-and-trade system to ensure that no member can technically acquire an undue amount of tokens and voting power. From the lens of agency, this would likewise mitigate complex agency dynamics, including the minor and major shareholder problems, if coordinated with a proper voting system. Once the industry-reaches phase 2 and a blockchain solution is decided upon and in development, the industry-DAO would need to finance the continuous operation and development costs of new features. We argue that the most suitable financing method is to charge a modest transaction fee when using the blockchain solution because it would create a continuous cash flow into the treasury. This would possibly also allow blockchain-skeptical actors from the FTI to trial and onboard the solution and foster network effects (Appendix C – SPOOR, 06:04). Following the cooperative principles, any profits should then be used to reinvest and develop the industry-DAO and blockchain solution and benefit members proportionally to their contribution (ICaCoop, n.d.).

Token contribution – The DAO token contributes initially by acting as a governance utility. Notably, proper token distribution enables the democratic decentralization of power. It amplifies the engagement of the token holders by allowing them to partake in the control of the DAO and thereby define and influence the blockchain solution. The token likewise contributes to the DAO as a possible fund-raising mechanism and incentivizes member contribution. Like many cooperatives (e.g., Coop) which reward its members in points, fiat money, and rank in proportion to their activities and transactions with the cooperative (ICAcoop, n.d.), a DAO should seek to reward its contributors (monetary and non-monetary contributions) with a proportional amount of tokens. However, the token can also contribute to the DAO by penalizing poor proposals, e.g., by staking a certain amount of tokens as collateral that will be lost if rejected or refunded, plus additional tokens if the proposal is accepted. This staking mechanism incentivizes members only to submit meaningful proposals while discouraging poor or superficial proposals. From an agency perspective, this could mitigate opportunistic behavior by aligning incentives but may introduce new complex issues, e.g., apathy.

Furthermore, by serving as an equity token, we want to mention possible free-riding problems (e.g., as seen in the case of MakerDAO), where token holders profit from the work of other members. To mitigate free-riding issues, we suggest that the FTI clearly define the rules and consequences of such behavior and act in case of a breach, e.g., that members must contribute with a certain amount of activity. Overall, the token contributes to the DAO by enabling decentralized governance and democratic ownership and motivates the members to act in the DAOs best interest.

5.3.2.5 Voting Systems

The voting system of the DAO is yet another intrinsic critical core design component. Even though it is not widely discussed in established literature (e.g., not part of the Reference Framework by Wang, Ding, et al., 2019), we found that grey literature (e.g., blog posts, websites) stresses voting systems as a critical factor for realizing a decentralized governance structure (Nigam, 2022). Additionally, voting power questions immediately arose when we introduced DAOs throughout our interviews and in Workshop2. SPOOR, for instance, were doubtful about having industry giants a part of the DAO as they speculated they would not want to engage on equal and democratic terms (Appendix C – SPOOR). It made them ponder if "[…] BESTSELLER just hypothetically would have more votes, like if everything was to put to the vote, will they have more votes, or will their voting power be greater than that of a small company, for example?" (Appendix C –SPOOR, 31:02). Same logic was raised by GANNI, saying that

> […] I think in an ideal world, everybody, no matter of their means, would just have the same voting right. But then I'm pretty sure that especially bigger companies, they're not going to be willing to partake in this platform because they don't see their benefit on it (Appendix C –GANNI, 25:40).

From our interview, BESTSELLER, one of the largest fashion giants in Denmark, expressed that they would be open to participating in an industry-DAO solution, especially for sustainability endeavors. BESTSELLER did not explicitly require that they would require more voting power but implied that contribution should reward equally by stating, "you would need to get at least what is required to look into it [joining the DAO], back" (Appendix C –BESTSELLER, 28:43).

DAO voting systems are complex to navigate, given the immaturity compared to, e.g., centralized cooperative models that are well established. A DAO may, therefore, also benefit from experimenting with various voting systems and perhaps forging custom ones. Voting systems can be modified down to the smallest detail of what is technically possible – there are essentially no limits. Since the members of the FTI industry-DAO are mainly non-technical, we suggest creating a simple and transparent voting system to facilitate engagement. For instance, even a technical delegate from the well-established MakerDAO highlighted that it was difficult navigating and engaging in the voting process (Appendix E). Throughout our interviews and workshops, we likewise got the impression that the FTI companies were most at ease with simple and practical processes.

Consequently, we suggest employing a weighted quorum-based token voting system (section 4.2.3.2), meaning one token equals one vote. We believe this approach would be appropriate for fostering engagement and actions while accommodating a decentralized governance structure. This system, however, conflicts with the Democratic Member Control principle of cooperativism that suggest one member equals one vote. Nonetheless, confer Tokenomics, we believe that it would incentivize and amplify the engagement of the members. Also, to ensure continuous democratic member control, we proposed a cap on the number of tokens a member can hold, e.g., a certain percentage threshold of the total tokens in supply. Furthermore, we previously suggested an equally distributed token airdrop that translates to equal voting rights for all members and mitigates a plutocracy problem. We remain agnostic to the exact required quorum (i.e., the minimum amounts of tokens required to pass a proposal), but given that the industry-DAO is voluntary for FTI actors and therefore predisposed to engage, we recommend setting it above the 51% threshold.

Once the industry-DAO reaches its second phase and obtains somewhat critical mass, we recommend transitioning into a delegated voting system (section 4.2.3.2) similar to "representatives" in cooperatives. In praxis, this allows the token holder to delegate their voting to another member, i.e., a delegate. The argument for this is to account for the increased scaling complexity in the industry-DAO. For example, improve decision-making concerning technical or legal proposals by having subject matter experts qualified to determine the appropriate decision. Once more, this is important considering the fact that most FTI companies are not technology experts; as SPOOR state, “just because you are good at marketing and branding does not mean you are good at data handling or business intelligence, etc.” (Appendix C –SPOOR, 28:28). Delegates could furthermore represent verticals within the FTI, e.g., subDAOs, suppliers, retailers, manufacturers, and distributors, to bridge the various ecosystem interests. Overall, delegated voting systems mitigate voter apathy, increase efficiency, increase the quality of decision-making, and represent a broad range of interests, which are advantageous once the complexity and size increase. However, the industry-DAO and its participants must be careful of centralizing power in the hands of a few influential delegates. To avoid this, the industry-DAO could set up election reviews providing all relevant information for each token holder to base their delegation on and review their activity. This may impose exceeding agency costs of monitoring the delegate, so the industry-DAO must carefully consider the delegates' selection and monitoring. Moreover, token holders should be capable of withdrawing and re-delegate their tokens at any time to ensure consistency, integrity, and flexibility. Delegates could additionally be compensated proportionately for their contribution (confer Tokenomics), which would all other things equal incentivize them to behave desirable and in the interest of the entire DAO.

Concerning proposal creation, we suggest allowing every token holder to create a proposal regardless of the number of tokens they hold. Nonetheless, to prevent an overwhelming number of proposals that might paralyze effectiveness, as mentioned in Tokenomics, we also suggest employing a staking mechanism in proposal creation. This also contributes to accountability since the members are vested in the success of the proposal.

In terms of balancing on-chain and off-chain voting, we initially suggest voting purely on-chain due to the assumed limited number of participants and, thereby, low gas fees associated with proposals. This supports complete transparency, as mentioned in the third core design category. Using on-chain was also the recommendation of the DE, saying that,

> In terms of the DAO, I think it has potential because something you can say is that on-chain governance is interesting. And especially if you are in an industry where you have not been used to collaborating and where there is a small amount of mistrust (Appendix C –Deloitte1, 18:52)

The FTI could advantageously employ the COMP Governor Bravo on-chain standard to accelerate DAO deployment, which is also suitable for a delegated voting system (section 4.2.3.3). While off-chain gas fees may be lower, we remain steadfast in strictly using on-chain for voting to ensure transparency and democratic decision-making. However, we recognize the efficiency of using off-chain governance, i.e., the overall governance, including decision-making, collaboration, knowledge sharing, discussions, and not only voting, which we will discuss in the last category.

5.3.2.6 Accountability and Conflicts

In an extension of the preceding core design categories, we find a need to address accountability and conflicts in an industry-DAO. Our literature review highlighted that numerous scholars emphasized the unclear legality surrounding DAOs. While this thesis does not concern the legal domain of DAOs, the literature likewise implies how it obfuscates the liability and accountability of its members. The lack of accountability is also reflected in MakerDAO, where a delegate states that many proposals misalign with the overarching strategy, and no one is accountable for their proposal (Appendix E). However, compared to many prevailing DAOs that consist of pseudonymous members, we advise that the industry-DAO authenticate the identities of its members to imply a higher level of accountability.

Nonetheless, this core design category focuses on answering questions about how the DAO manages conflicts and disputes and who is accountable for proposals. While we have suggested a mechanism that would disincentivize people from poor proposals and a voting system that ensures the overall alignment, we have yet to account for realizing and carrying out those proposals as per agreement. At a practical level, we suggest explicitly detailing accountable proposal-owners in each proposal and any contribution reward they may receive and aligning rules and guidelines in the DAOs' whitepaper. If any member feels that the proposal is not executed per the agreement or if any member violates the predefined set of rules and responsibilities, the members can put it to a vote. Likewise, any dispute or conflict should also be resolved through voting. However, once the industry-DAO reaches its second phase and increases in member size, voting on every minor conflict would become impractical. We then suggest organizing a small team responsible for conflict resolution where members can raise inquiries and decide on the resolution through on- or off-chain voting.

Another vital concern for this particular industry-DAO is ensuring the accountability of the selected TSP that will develop the blockchain solution. In essence, this translates to a principal-agent problem where the industry-DAO is the principal, and TSP is the agent. To reduce associated agency costs, the industry-DAO and TSP could employ smart contracts and trusted Oracles (e.g., third-party vendors) to confirm the delivery of agreed milestones and thereby trigger payments. Another option is to include the TSP as a member of the DAO in the pursuance of aligning interests. Ultimately, however, this would impact FTI's influence and ownership of the solution, and we thus let this decision reside with the FTI.

5.3.2.7 Operations and Development

The last core design category is operations and development. This spans all the other categories and is critical to consider for an industry-DAO's long-term growth and success. Intrinsically, once the industry-DAO is launched, it will require ongoing operations and development, e.g., onboarding members, updating smart contract functionality, and iteratively refining all the design core categories.

Creating and operating a DAO in praxis can be exhaustive and requires somewhat technical capabilities that most of the FTI actors currently do not possess (Appendix C). To get easily started and for the purpose of experimentation and learning, we recommended FTI to trial Aragon[4], allowing them to create a DAO in a matter of minutes and facilitating setting up all seven design core categories. Conversely, Aragon's predefined template may not be satisfactory in the long run, but it provides vast resources and flexibility to extend the DAO through custom-made smart contracts and rules. Likewise, using Aragon is an excellent starting point for establishing familiarity with DAOs and their functions, creating a solid foundation to build an advanced industry-DAO.

At its core, the collaboration between the members of the industry-DAO shapes the operations and development, reaffirming the importance of its members' active participation and commitment. In traditional organizations, all business activities occur in the workplace and within the firm's boundaries and channels, e.g., emails, meetings, and calls. To keep things simplistic, we advise the FTI to operate in the same way, i.e., mainly off-chain governance (but use on-chain voting) and create various forums for collaboration and information sharing, e.g., websites and mailing lists. Once the industry-DAO's complexity and size increase, creating additional structures around operations and development might be worthwhile.

Likewise, the industry-DAO must continuously review its progress and needs, e.g., changing its governance mechanisms, including the voting system, rules, structure, etc. Drawing on the fifth cooperativism principle (Education, Training, and Information), we propose that the industry-DAO provides relevant information and training to its members, allowing them to contribute effectively to the development of the DAO. This would include explaining all of the guidelines and rules of the DAO, e.g., the functioning of the voting system, token management, proposal creation, and more. An example of this is MakerDAO's governance facilitators, as mentioned in Form, Roles, and Structures. Besides that,

[4] https://aragon.org/aragon-app

however, we also recommend providing non-DAO education, such as sustainability hackathons and data workshops that will ultimately contribute to realizing the DAOs purpose. Correspondingly this conforms with the seventh principle of cooperativism (concern for community) and co-opetition by focusing on the overall collaborative and sustainable development of the entire fashion- and textile industry.

5.3.2.8 Summary: Industry-DAO CDF

Throughout iteration 2, we analyzed and applied the different categories on the FTI and gathered and applied relevant theories, literature, data, and opinions to create a set of suggestions and guidelines for the FTI to follow when creating the industry-DAO. In the last category, we highlighted how they could create a DAO and test the concept and the design. To summarize the design and development, we encapsulate all the core design categories across phase 1 and phase 2 into the industry-DAO Core Design Framework, as seen in Table 6. The FTI can leverage this to help design an industry-DAO.

Table 6 - Recommendations for the FTI based on the industry-DAO Core Design Framework

Category	**Phase 1**	**Phase 2**
Purpose	Enable a collaborative forum to develop a business strategy and establish the best market approach. Define requirements and select a TSP.	Manage the blockchain solution, innovate new features, onboard the rest of FTI, and continuously re-evaluate business strategy.
Membership	**Purpose**: Collaborate with FTI actors to meet essential requirements to remain competitive using blockchain. **Who**: Initial founder team open for all industry actors and early contributors	**Purpose**: Collaborate with FTI actors, get voting power, and possibly access to the blockchain solution (depending on the design). **Who**: All FTI actors
Form, Roles, and Structures	Completely flat decentralized structure, no roles, but consider relevant roles.	Decentralized structure, possible subDAOs, delegates, and roles (e.g., governance facilitator) held by FTI actors.
Tokenomics	**Initial token distribution**: Airdrop equally to founding members. **Capital gain:** Raise funds through early investors, donations, or token sales. **Token Contribution**: Decentralized governance and incentive alignment	**Token distribution**: Ensure proper token supply management (burn/mint). **Capital gain:** Transaction generated revenue from a blockchain solution–possible investment and token sales. **Token Contribution:** Decentralized governance, incentive alignment, and possible access to the blockchain solution

Voting Systems	Quorum-based weighted token voting system. All voting happens on-chain with-off chain collaboration/governance. Every token holder can create and vote on proposals.	Delegated voting system. Mainly on-chain voting - consider off-chain depending on member size and gas fees. Every token holder can create and vote on proposals, but through a staking mechanism.
Accountability and Conflicts	Disputes and conflicts are continuously handled through voting. Verify member identities.	Disputes and conflicts are continuously handled through voting by a dedicated team. Verify member identities.
Operations and Development	Leverage Aragon to create the industry-DAO. Continuously iterate on all seven categories. Utilize traditional channels to collaborate with members, e.g., website, mail.	Consider custom smart contracts on Aragon or migrate to an entirely new DAO. Continuously iterate on all seven categories. Utilize traditional channels to collaborate with members, e.g., website, mail. Provide relevant training to members.

5.3.3 Demonstration

The demonstration phase of iteration 2 is generally identical to the demonstration from iteration 1. However, this time, we visually demonstrated our IS artifact (industry-DAO CDF) to two subject matter experts in online interviews. The first is the same Deloitte employee from iteration 1, and the other subject matter expert is the Head of Digital from Lifestyle & Design Cluster (LDCluster), which has deep knowledge about the FTI and its various actors. Consequently, we mainly seek to obtain technical-related feedback from the Deloitte employee and industry feasibility-related feedback from the LDCluster employee. In evaluating the industry-DAO Core Design Framework (CDF), we presented the DE and LDCluster each category and our respective suggestions. Furthermore, we inquired about their general impressions and top of mind regarding the industry-DAO CDF.

5.3.4 Evaluation

Since the answers to the categories can be somewhat ambiguous, we sometimes interpret their feedback as a whole in each category, e.g., what they are implying with certain statements. Moreover, we do not delve into the implications or usefulness of their feedback in this section but rather apply it in the design and development of Iteration 3.

We start by inquiring about their opinion of the industry-DAO CDF. The overarching opinion was positive, with them stating: “Overall, I would say that it makes a lot of sense” (Appendix C – Deloitte2, 14:10) and “I would like to bring something like this to my Nordic Blockchain Alliance meeting to show them” (Appendix C – LDCluster, 00:13:13).

The LDCluster participant highlighted a new sector collaboration (LDCluster, n.d.) which is the first time the FTI had collaborated this extensively (Appendix C – LDCluster, 01:03:21). Furthermore, stating that the sector collaboration could be seen as a "[…] prototype of what needs to happen" (Appendix C – LDCluster, 01:13:08). Many of the aspects found in the sector collaboration mimic those proposed for the industry-DAO and the LDCluster participant agreed that if we could produce a proper visualization of the industry-DAO CDF so the FTI actors could follow the story (Appendix C -LDCluster, 01:12:10), they could realize that they are proving the viability of the DAO, without the benefits highlighted by us in Figure 16.

On the aspect of categories in the industry-DAO CDF, the DE enjoyed that aspects such as voting systems were covered and that the purpose category was the first category in the industry-DAO CDF (Appendix C – Deloitte2, 14:46). This was also supported by LDCluster stating, "I like having purpose as the first thing and covering aspects such as Tokenomics and voting systems is really cool" (Appendix C – LDCluster, 14:29). But areas of improvements were also identified for the industry-DAO CDF, one example being "I think that the two [Tokenomics and Voting Systems] might be too blockchain technical, and I would probably change the wording if you wanted to show it to the industry (Appendix C – LDCluster, 14:29).

Further feedback was provided by the DE, who had two areas of improvement for the industry-DAO CDF. The first is managing the taxonomy level of the different categories because "there is far [taxonomy wise] from purpose to conflicts" (Appendix C – Deloitte2, 14:46). Suggesting that this could also partially be assisted by revisiting the category headers and potentially grouping them or cutting some (Appendix C – Deloitte2). The second aspect of improvement identified by the DE was the balancing act of surface-level suggestions or specific suggestions, as in the case of the Aragon recommendation (Appendix C – Deloitte2).

Both the DE and the LDCluster participant highlighted how the regulatory changes were the main enablers of this kind of project (Appendix C - Deloitte2; LDCluster) and that other industries facing similar regulation could use the industry-DAO CDF (Appendix C - Deloitte2).

Purpose - The purpose category was the epicenter of our two interviews, in which many conversations tied back to the purpose of the industry-DAO. Broadly speaking, both the DE and LDCluster agreed with the part of our phase 1 purpose of establishing a trustless collaborative forum for the FTI (Appendix C – LDCluster; Deloitte2). They both argue that the purpose becomes multifold, among other things, to "get shared solutions" (Appendix C – Deloitte2, 22:25) and enable data and other technical-related standards. LDCluster references use cases in other industries, including the cooperative Danish Crown, that upskill their entire value chain end to end, on how to work with data (Appendix C – LDCluster). She also refers to other FTI initiatives in other countries, such as South Korea, that transform "[…] the industry so it is not only the value chain and traceability but to get the whole implementation of all the digital tools that are currently revolutionizing the industry right now", (Appendix C – LDCluster, 30:31). Essentially, she draws on multiple inspirations from other uses cases that have successfully manifested, implying that their purpose could be similar in an industry-DAO for the FTI (Appendix C – LDCluster). That said, she also stresses that the industry-DAO's purpose should be crystal clear in defining that it differentiates itself and is not a competitor to existing collaboration establishments in which the FTI is already investing resources. Instead, it should be positioned as an extension to enable and fill the technical gap in the FTI, including the design of a blockchain solution and data standards (Appendix C – LDCluster). Respectively, LDCluster also envisions the purpose of phase 2 as not only being a blockchain solution, but

> "[…] to manage a digital platform, because then it is Web3 we step into and the whole opportunity to sell digitally. And then we are in really getting into some of that which is critical for the industry to reduce Co2. We need to sell more, but produce less. Period. This is the goal with the future." (Appendix C – LDCluster, 26:10)

Ultimately, the DE and LDCluster implied that the industry-DAO's purpose should be to catalyze a digital-enabled ecosystem in the FTI, creating new synergetic value effects enabled by blockchain.

Membership - For the second category, the DE agreed with the member purpose, stressing that he believes that the initial incentive of the DAO should be to partake in a collaboration that, in turn, would allow the industry-DAO members to be part of defining the requirements of potential blockchain solutions and more (Appendix C – Deloitte2). In terms of our suggestion of who should be allowed to participate in the industry-DAO, LDCluster once again referenced the sector collaboration and how there are grey areas in defining who is considered a part of the fashion- and textile industry, implying that the industry-DAO could benefit from creating specific boundaries as seen in the sector collaboration (Appendix C – LDCluster).

Form, Roles, and Structures- The DE feedback regarding Form, Roles, and Structures was positive, saying that he thinks "it sounds reasonable" (Appendix C – Deloitte2, 35:00). LDCluster on the other hand, clearly stated that "there has to be defined something about […] a secretary role" (Appendix C – LDCluster, 37:59) because her experience has shown that the industry is unlikely to organize themselves. She expressly points towards someone capable of managing practical tasks, such as meeting invites and maintaining momentum, and refers to LDCluster as a possible "secretary" since they may request funding (Appendix C – LDCluster).

Tokenomics - Generally, both the DE and LDCluster approved of our suggestions and the importance of Tokenomics (Appendix C – LDCluster; Deloitte2). For our suggestion of an initial token distribution through airdrop and allowing the possibility of subsequently injecting capital, the DE employee stated that "There is a big difference in putting in money or time or both. I think you will have to be sharp on what you are getting [tokens]" (Appendix C – Deloitte2, 35:18). Furthermore, he recommended that we provide clarity of possible dilution of tokens in the future, as a result of the increase in token supply (Appendix C – Deloitte2). In terms of gaining capital and using the token as an asset-backed token, i.e., it provides access to a possible blockchain solution, they both agreed that the token should not gate the blockchain solution (Appendix C – Deloitte2; LDCluster). Instead, they supported our argument of simply employing transaction fees of the blockchain solution, with LDCluster stating, "Simple business model, good point" (Appendix C – LDCluster, 35:52).

Voting Systems - LDCluster did not have any specific feedback regarding the voting system except saying that it sounded "Super exciting" (Appendix C - LDCluster, 50:55). However, the DE questioned our proposal of utilizing a staking mechanism in creating proposals and the definition of on-chain and off-chain voting. He challenged our argument that a staking mechanism would prevent an overflood and proposal of poor quality, saying that

> "I mean, have you not created a system where you [FTI actors] do not dare to be innovative? […] You end up incentivizing people to only create proposals that you are sure will go through. […] in reality, you want collaboration, you want people that take risks" (Appendix C – Deloitte2, 40:55; 41:34).

Conversely, he suggested utilizing a reputation system of some sort and stated that "We know who [the members] it is, so just that they have their brand in itself is some sort of stake" (Appendix C – Deloitte2, 42:45). Regarding our suggestion of considering off-chain voting in phase 2, he felt it was not clear that we propose voting off-chain and then registering the results on-chain. Consequently, he recommended us "to be very sharp on your formulation there […]" (Appendix C – Deloitte2, 39:38). Partly, he felt this ties back to the benefit of enabling transparency and a democratized process.

Accountability and conflicts- When asked regarding the accountability and conflicts category, neither of them had any input on the category, only saying that it "Sounds good" (Appendix C – Deloitte2, 47:10) and "I agree" (Appendix C – LDCluster, 51:56).

Operations and Development - The seventh category was met with two distinct feedback points. The first point of feedback was the specific suggestion of utilizing Aragon as an initial DAO provider. The DE stated, "I am not excited about you recommending something specific" (Appendix C – Deloitte2, 48:28) the DE raises concerns regarding better alternatives potentially being overlooked by the FTI, due to this. LDCluster was also hesitant about the specificity of our suggestion, asking if they would be "[…] dependent on something in Shanghai again" (Appendix C – LDCluster, 59:18) and that the FTI was uneased about having tech giants controlling the solution and their data.

Secondly, LDCluster claimed that for phase 1 of operations and development to succeed, the industry-DAO would require a team with the right technical and commercial capabilities. She refers back to a previous blockchain project led by CBS that the reason it "[…] failed after it stopped was that we did not have a tech provider" (Appendix C – LDCluster, 55:16). LDCluster also highlights that while a bottom-up approach is valuable in setting the requirements, technical people will at some point have to take over for building a workable solution that functions in praxis (Appendix C – LDCluster).

5.4 Iteration 3

This section will re-iterate the design and development of the industry-DAO CDF based on the evaluation from iteration 2.

5.4.1 Objectives of Solution

We concluded the second iteration by evaluating our IS artifact, the industry-DAO CDF, with feedback from the DE and the LDCluster representative. We obtained general and specific feedback on the suggestions provided for the different categories of the FTI. Therefore, the goal of the third iteration of this thesis will be to incorporate some of the general feedback for the industry-DAO CDF as well as modifications of the specific category suggestions. Ultimately this iteration will finalize the IS artifact and create a visually appealing version that the industry could use in the future.

1. Visually improve the industry-DAO CDF.
2. Refine the category suggestions for the FTI based on the evaluation from the second iteration.

5.4.2 Design and Development

We will start the third iteration with the general improvement aspects identified through the evaluation in iteration 2. The main feedback provided, in general, was in aspects of the visualization of the industry-DAO CDF. According to LDCluster, creating an appealing visualization of the industry-DAO CDF is beneficial to guide the FTI actors understanding of the framework. Therefore, to provide an easier way to comprehend the industry-DAO CDF, we created a visualization as seen in Figure 17. This includes a visual understanding as well as the inclusion of key questions used to interpret and define each category. The suggestion of making the taxonomy levels of the different categories for the industry-DAO CDF more consistent was considered during the visualization creation. However, we decided that the purpose and membership category was the only two that drastically differed from the rest, and since they are put at the start of the framework, we decided not to change this.

The last aspect of the general feedback was reconsidering the terms or names of the different categories. We chose not to change the categories' terminology due to their connection with blockchain and DAO literature and therefore provide an easier opportunity for industry-DAO CDF users to get a better understanding of the categories. We provided a compromise by introducing commonly understood icons in the visualization seen in Figure 17.

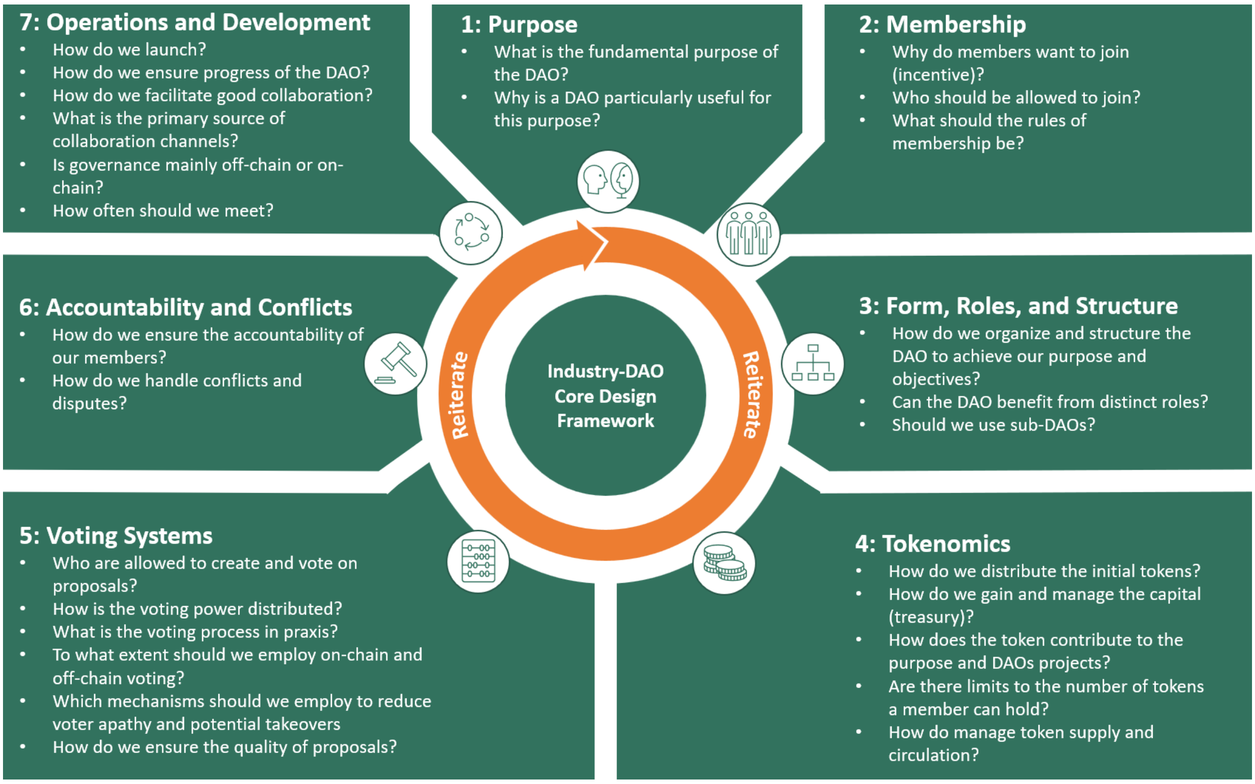

Figure 17 - Industry-DAO Core Design Framework General Visualization – (Own Creation)

Purpose - There were two suggestions provided by the DE and LDCluster when we presented the purpose category. The first suggestion was to highlight the purpose of the industry collaboration possibilities enabled by the DAO with the accompanying values proposed by the DAO technologically. Nevertheless, it was important that, at the same time, that the industry-DAO adequately differentiated itself enough from other existing industry associations or work groups. If it did not distinct itself from those, then the FTI actors would be less inclined to participate due to the amount of membership fees and time commitments they already face.

The second suggestion was the change of technological goal for the industry-DAO. The first set of suggestions focused on the collaboration towards an ISCM blockchain solution, as this was the most valuable blockchain purpose identified from literature and our empirical data. However, after the evaluation, the technological goal for the industry-DAO should be to focus on enabling a blockchain ecosystem, i.e., a plethora of blockchain solutions that could create value in multiple verticals. The purpose of the industry-DAO in phase 1 should therefore be for the participants to collaborate toward the requirements and specifications of some of the initial solutions. Where as in phase 2, the focus should shift on managing the blockchain ecosystem (Web3) or digital platform of blockchain solutions that is enabled through the implementation of an industry-DAO.

Membership - The second category had two areas of feedback. The first was that, as above, the members needed to be able to see the difference from existing offers, for them to want to join, but the DE and LDCluster both agreed that the main reason that members would join would be to comply with regulation and create value by earning more, saving costs, or creating new points of value.

The second aspect of feedback was the LDCluster highlighting that the industry still does not possess the capabilities to create a blockchain solution, let alone a blockchain ecosystem, and therefore wondered about whether technology partners should participate. We suggest that technology partners or consultancies could be used as external help in phase 1 but potentially be allowed as members in phase 2, depending on the industry-DAO's dependence on the provider. Including technological capabilities as members could mitigate agency issues, but it also surrenders tokens, so it has to be carefully considered whether or not they should be members or just remain external contractors. In extension of this feedback, the question about who constituted as FTI actors were also raised, and therefore we suggest that the FTI creates a set of definitions to include what being an FTI actor constitutes, i.e., is a logistics company delivering for the FTI a FTI actor? This would also have to define whether there were limitations about which country the participants had to reside in.

Form, Roles, and Structure - Based on the feedback in the evaluation in iteration 2, we will change our suggestion for the first phase of the industry-DAO CDF. Therefore, the suggestion will incorporate a suggestion for phase 1 to include the role of what was well defined by the LDCluster participant as a secretary role. The secretary role would be responsible for tasks like meeting invites and ensuring updates gets distributed to the members. The LDCluster proposed that they (Lifestyle and Design Cluster) could be an ideal actor for such a role due to their previous experience with tasks like this. We also alter the suggestion to now include, rather than research, subDAOs in phase 2 since they are used to working in such constellations in the current sector collaboration. Lastly, we will include a suggestion of letting members in phase 1 highlight how they specifically, can contribute, whether it be with HR, tech, data or other areas of expertise and possibly partaking in ambassador or diverse functional roles.

Tokenomics – While we agree with the DE that there is a significant difference in contributing with time or capital, we argue that a concrete suggestion for the relationship (e.g., 100 DKK = 1 token and 1 hour = 1 token) would counteract the purpose of the industry-DAO, i.e., letting the members decide. Moreover, we recommend exercising caution when providing specifics as this may impose agency costs and disputes associated with monitoring if members indeed have fulfilled their work. Conversely, members may vote on a proposal for raising funds in exchange for a specified number of tokens. Similarly, we suggest that non-monetary token rewards are given to, e.g., proposal contributors, members carrying out another proposal, or from an exceptional effort that is likewise agreed upon through voting. Figure 18, exhibits a fictional scenario of how the industry-DAO agrees on contribution rewards through voting.

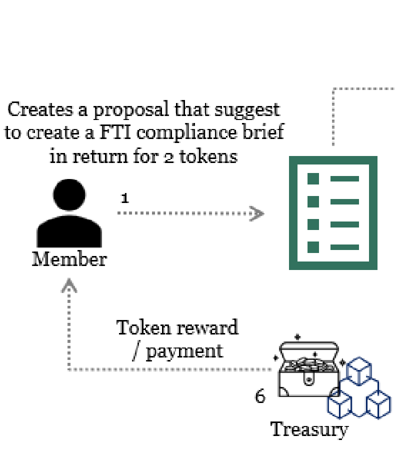

Figure 18 - Conceptual fictional process of a token contribution (Own Creation)

Furthermore, while important, we deem that providing specifics about gas fees and token dilution, as suggested by the DE, becomes rather exhaustive and irrelevant for the purpose of this paper and industry-DAO CDF. Lastly, we withdraw the suggestion of the token providing access to the blockchain solution which was originally proposed in phase 2.

Voting systems - We dismiss the staking mechanism from our suggestion to foster a culture of innovation and avoid disincentivizing risk-taking and creativity as highlighted by the DE. As mentioned in the evaluation, the members stake their reputation and brand by not being pseudonymous. Alternatively, if members still create excessive or low-quality proposals, the industry-DAO may opt to do a reputation based-voting system, as mentioned in Voting systems, via a new native token or transition the existing one. Moreover, we reinforce our description of utilizing off-chain voting as a hybrid approach in conjunction with primarily on-chain voting. For instance, by utilizing decentralized storage systems such as Snapshot for initial sentiment polls and subsequently proposing them on-chain if passed.

Operations & Development - While the DE and LDCluster were somewhat skeptical of using Aragon, we believe that a DAO platform such as Aragon is an ideal starting point for the FTI in initiating a genesis industry-DAO. Aragon provides excellent resources for everything related to DAOs enabling even non-technical members to take part. We, therefore, retain the recommendation, but highlight the possibility of using alternatives for phase 1 for this category. However, as pointed out by LDCluster, the FTI has previously lacked a technical lighthouse that is required to actually realize a solution in praxis. Consequently, the FTI industry-DAO could benefit from upskilling members or bringing in an external TSP to guide technical-related aspects of the DAO and subsequent blockchain solutions as mentioned in membership.

5.5 Analysis summary

In an endeavor to develop our IS artifact, the industry-DAO CDF, this analysis has undergone three DSRM iterations. The first two iterations followed the complete DSRM process cycle (Figure 4), while the third and last iterations finished at the design and development stage due to the limited scope of this thesis. That said, we discuss the results and implications in the Discussion. The objective of iteration 1 was to provide arguments and concrete suggestions for the imperative design considerations of an industry-wide blockchain solution in the FTI to enable the effective design of a DAO. With this in mind, we presented four overarching design considerations and provided concrete suggestions and arguments for each, drawing on our theoretical frameworks and interviews with four FTI companies. These specific recommendations set the high-level design to facilitate the effective enablement of an industry-wide blockchain. Nevertheless, after an evaluation with a subject matter expert from Deloitte, we changed our perspective on the purpose of the DAO and concluded that a specific blockchain proposal might not be necessary for the conceptualization of a DAO for the FTI. As a result, we omitted our recommendations for a blockchain solution put forward in iteration 1 as a basis for our DAO design and, instead, remained neutral towards the specific design of a potential blockchain solution going forward.

Correspondingly, the objectives of iteration 2 were to define the benefits and influential core design categories of an industry-DAO and provide concrete recommendations for the FTI. We derived our IS artifact, the industry-DAO Core Design Framework, comprising seven core design categories based on our theoretical framework and data collected from our interviews. Additionally, as summarized in Table 7, we produced recommendations and rationale for each of these categories relevant to the FTI. Based on the evaluation from iteration 2 with a subject matter expert from Deloitte and one from Lifestyle and Design Cluster, we correspondingly refined and adjusted the industry-DAO CDF suggestions for the FTI and presented an enriched general visualization of the framework as detailed in Figure 17. We summarize the revised and finalized recommendations for the industry-DAO CDF in Table 7 below.

Table 7 – Updated Recommendations for the FTI based on the industry-DAO CDF

Category	Phase 1	Phase 2
Purpose	Enable a collaborative forum to develop a strategy and establish the best market approach. Ensure clear differentiation from existing industry offers. Define FTI requirements.	Manage the blockchain solution(s) and potentially expand blockchain ecosystem. Innovate new features, onboard the rest of FTI, and continuously re-evaluate strategy.
Membership	**Purpose**: Collaborate with FTI actors to meet essential requirements to remain competitive using blockchain. **Who**: Initial founder team open for all industry actors and early contributors. Define 'FTI actors'.	**Purpose**: Collaborate with FTI actors, get voting power, and possibly access to the blockchain solution (depending on the design). **Who**: All FTI actors
Form, Roles, and Structures	Completely flat decentralized structure, establish roles, e.g., secretary and possibly other functional roles. Explore subDAO structure.	Decentralized structure, possible subDAOs established, delegates, and various roles (e.g., governance facilitator) held by FTI actors.
Tokenomics	**Initial token distribution**: Airdrop equally to founding members. Establish clear guidelines for dilution. **Capital gain:** Raise funds through early investors, donations, or token sales. **Token Contribution**: Decentralized governance and incentive alignment	**Token distribution**: Ensure proper token supply management (burn/mint). Establish clear guidelines for dilution **Capital gain:** Transaction-generated revenue from blockchain solution(s); investors, donations, or token sales. **Token Contribution:** Decentralized governance, incentive alignment
Voting Systems	Quorum-based weighted token voting system. All voting happens on-chain with-off chain collaboration/governance. Every token holder can create and vote on proposals.	Delegated voting system. All voting on-chain voting. Consider using off-chain voting for initial sentiment polls depending on member size and gas fees. Every token holder can create and vote on proposals.
Accountability and Conflicts	Disputes and conflicts are continuously handled through voting. Verify member identities.	Disputes and conflicts are continuously handled through voting by a dedicated team. Verify member identities.
Operations and Development	Leverage DAO platforms, e.g., Aragon, to create the industry-DAO. Continuously iterate on all seven categories. Consider using technical externals to augment development Utilize traditional channels to collaborate with members, e.g., website, mail.	Consider custom smart contracts or migrate to an entirely new DAO. Continuously iterate on all seven categories. Utilize traditional channels to collaborate with members, e.g., website, mail. Provide relevant training to members.

6. Discussion

This chapter discusses four different sections and parts of the thesis: the theory section, the methodology of the thesis, the implications of the results, and our suggestions for further research.

6.1 Discussion Theory

In our theory section, Figure 5 to was created for a visual overview of the theoretical schools of thoughts we utilized to further understand Decentralized Autonomous Organizations (DAOs). We defined the three categories to further understand DAOs due to the limited research on the topic, those being (1) the technological overview of DAOs, a blockchain description, (2) the governance section comprising platform theory and agency theory, and (3) the organization category consisting of cooperativism and co-opetition. Next, we will describe our thoughts and arguments for the theory included.

Technology – we decided that having a satisfactory knowledge of the technical possibilities of blockchain technology was crucial for the ideation and conceptualization of a blockchain solution and a DAO. When we collected data for the DAO design considerations, we realized that the understanding of the technical aspects was mutualistic. Knowing what was technically possible on a DAO helped us ask questions for important design criteria and reign in expectations from FTI actors. In the final stages of the industry-DAO CDF, we propose utilizing Aragon as an easy to setup fail-fast solution for the industry-DAO; while the concept of Aragon is to make DAO creation easy to understand and execute, we remain confident that a higher than rudimentary knowledge of blockchain is a precondition for a successful rendition of an industry-DAO.

Governance – to further understand how the governance of a blockchain solution and a DAO should be created, we identified common areas of traditional governance and different governance terms found in theory. We presented areas of agency theory that we expected to apply to the different design considerations. Areas such as information asymmetry, agency conflicts, and agency costs were, to some extent, invaluable for understanding the different design choices suggested for the industry-DAO. While aspects of market transparency, moral hazard, and adverse selection was not utilized, we argue that it would be crucial in certain areas for a deeper understanding of a DAO. For example, when understanding the entire design of Tokenomics, which could be a thesis in itself, identifying instances of moral hazard would be essential for the DAO. We expected platform theory to be a larger part of the DAO's design considerations and understanding than it ended up being. Openness from platform theory was similar to concepts found in cooperativism, blockchain literature, and the opinions of the actors in the FTI. We mainly used platform theory to establish the importance of a good openness design and how network effects could adversely impact the blockchain solution's or DAO's success if designed improperly.

Organization – reflecting on the research process we have been through with this thesis; this has presented itself as both the most important theoretical category. The inclusion of cooperativism has been vital for both designing the DAO and translating the concept of a DAO into something that people not well-versed in blockchain would understand. We often found ourselves stating something akin to "think of a cooperative like Arla" when talking to the industry actors due to their difficulty understanding the concept of DAOs. Without the actors understanding the concept correctly, we could not accurately assess the applicability of a DAO in the FTI. We additionally drew on concepts and questions from Hildebrandt & Brandi (2017), who made cooperativism more tangible. Their dissections of the cooperative model made cooperativism more relevant in a DAO context than it would have otherwise been with the distinction of the ownership strategy and business strategy. The other theoretical aspect we had as part of the organizational category was the theory of co-opetition from Brandenburger & Nalebuff (1996; 1997; 2021). This aspect was introduced to the research after the workshops and the first interview, where we realized that co-opetition was more applicable than collaboration theory, which we had intended to use. Using co-opetition was essential to understand how competitors could be complementors and how large and small actors can be incentivized to collaborate. Lastly, in hindsight, we would have introduced and used the 8 Principles for Managing A Commons presented by Elinor Ostrom. The principles are based on handling the commons, i.e., those things we all own together, and it highlights how if nobody takes responsibility for something, it will inevitably be abused or mismanaged. In future research of an industry-DAO, we heavily suggest adopting these principles in addition to the core principles of cooperativism to bolster the design of an industry-DAO even further.

6.2 Discussion Methodology

This section covers the chosen methodology applied in this thesis and highlights whether or not it answered our research question: *How should an industry-wide blockchain solution in the fashion- and textile industry be governed?*

To create our foundation of knowledge required to answer this research question, we started by creating our different constellations of search permutations to find any relevant literature related to our different search terms: *DAO, Fashion, Blockchain, Governance, Cooperatives,* and *Platform*, with all relevant variants of spelling (see Appendix A). This resulted in us reading through 4000 titles of potentially relevant literature from research databases like IEEE, Scopus, and Google Scholar. While this could have been limited by additional filters on the search results, we argue that due to the extensiveness of our search, we identified literature that was e.g., released two weeks prior to our search, which could have been missed if it was filtered based on, e.g., the number of citations. We ended up with 77 sources covering many of the questions we had before beginning the literature search, which ultimately resulted in the literature review answering two of our initial research sub-questions proposed at the start of the thesis.

Our methodology was structured based on the Saunders Research Onion, which took us through the different stages of creating a methodology. We decided to structure our analysis after the Design Science Research Methodology (DSRM) to help navigate in a context where the literature was lackluster. The iterative approach of the DSRM allowed us to take in learnings to adapt and pivot on our IS artifact to create something more aligned with what is desired by the fashion- and textile industry (FTI). As no previous model or framework existed, to be tested in the FTI we had to create it based on data and feedback, which warranted adopting a qualitative approach for the study. We collected the qualitative data through semi-structured interviews to ensure coverage of the areas deemed relevant and to allow any relevant information from the participants to be further explored. Further research on the topic could adopt a quantitative approach to test our IS artifact or obtain answers from a larger population of the FTI.

We applied pragmatism as our research philosophy, in which no one source of truth exists or is absolute or fixed; instead, it seeks to create knowledge that creates practical actions and usefulness. Due to our pragmatic philosophy, we do not argue for our IS artifact being the only correct way to design an industry-DAO. It is meant as a framework that the FTI could follow to use the suggestions and actions proposed to create an FTI industry-DAO. Due to the nature of the research, we argue that applying a pragmatic philosophy was the correct decision. We employed an abductive approach to support the creation of the industry-DAO CDF. This was particularly useful because the literature on creating an industry-DAO is rare, if not nonexistent, and therefore we had to support our answer based on theoretical concepts found in other areas.

The last aspect of our methodology will be the sampling technique applied to find our FTI actors. We utilized the non-probability sampling method of purposive sampling. We chose the sampling method to cover the different sizes and types of fashion companies identified in research regarding blockchain in supply chains for the fashion industry. Additionally, we wanted to identify FTI actors who owned the entire supply chain to determine the difference in their view on the industry-wide blockchain solution. While the sampling technique was designed for the blockchain solution aspect of the thesis, having this constellation of participants was still helpful for creating the industry-DAO CDF. If the thesis had extended time or the decision to focus on the DAO design had been identified earlier, applying a probability sampling technique could have shown more representative answers for the general FTI actor. We do however realize that the participants from the FTI were mostly residing in business units focusing on sustainability and ESG, which could have consequences on the integrity of the thesis' results. This could mean that the participants are more inclined to agree to initiatives that would further the growth of their company within the sustainability, traceability or transparency space, and if other business responsible actors from the companies were interviewed, the eagerness to participate or the extent of participation might be different.

6.3 Implications of Industry-DAO CDF

The outcome of this thesis is an IS artifact named industry-DAO Core Design Framework. The FTI can leverage the industry-DAO CDF in designing an industry-DAO for the purpose of governing an industry-wide blockchain solution. The practical application of the IS artifact is two-fold. Firstly, this thesis provides seven core design categories helpful in designing an industry-DAO, allowing the FTI to comprehend the DAO phenomena and its effects on the industry and also a groundwork for them to contemplate the various design considerations. Secondly, we provide concrete recommendations for each category, facilitating and augmenting their decision-making in arranging an industry-DAO. Not only that, by providing theoretical and empirical arguments for our recommendations, we enable the FTI to judge the conclusions and reiterate or develop them even further.

Moreover, our analysis implies that it is theoretically possible to apply cooperativism principles in designing an industry-DAO. We highlighted the synergetic effects between cooperativism and DAOs, particularly how this is relevant in an industry context where untrusted actors share a common goal. Furthermore, by employing agency theory throughout our design, we argue that DAO possesses theoretically sound characteristics for overcoming otherwise traditional agency problems, as Boss & Sifat (2022) claimed. On the flip side, we also denoted that new complex agency dynamics can arise, such as minor and major shareholder problems and misalignment of incentives between members depending on the Tokenomics and voting system. Furthermore, our empirical data regarding voting power emphasize the importance of ensuring democratic and decentralized governance in DAOs through a proper design. For instance, some FTI companies were skeptical about engaging industry giants as they felt their objectives were utterly misaligned.

However, the industry-DAO CDF is mainly a theoretical construct that we did not yet get the chance to test in real-life settings and thereby prove its practical utility. Consequently, we advise the FTI to use the industry-DAO CDF suggestions as underlying guidelines and adjust where necessary. Furthermore, another limitation of the framework is that it does not account for all DAO-related design aspects. Questions remain, such as which blockchain to deploy the DAO on, the standard of the native token (e.g., ERC-20 or ERC-721), how to leverage and employ big data and artificial intelligence, legal and regulatory concerns, and more. In praxis, there will also be many details related to our suggestions that we have not covered, e.g., the exact amount of token cap, quorum, number of delegates, specific roles, etc. In this regard, we advise exercising critical thinking and an agile approach to refine the various details iteratively. Overall, we received positive feedback regarding the industry-DAO CDF from the subject matter experts, even claiming that our findings could be theoretically applicable and valuable in other industries facing similar compliance tensions. Academia can likewise utilize our seven core design categories without our concrete suggestions as a stepping stone in theoretical or empirical applications.

While not an explicit part of our IS artifact, this thesis also provided overarching recommendations for an industry-wide supply chain management blockchain solution in the fashion and textile industry. From iteration 1, we seem to conform with literature and real-life enterprise blockchain applications that a public permissionless blockchain type is not ideal in an enterprise setting. Also, we seem to follow the findings by Rauchs et al. (2019), in which most enterprise blockchain networks utilize a technology service provider. We provided empirical data showing that this was the preference of the FTI companies and was the recommendation by both subject matter experts. Thirdly, our empirical data conform with the literature stating that blockchain imposes the most significant value in a fashion- and textile supply chain context, from the statements of our four interviews and two workshops. On the flip side, this thesis did not delve into the technical properties of a blockchain solution, and we, therefore, advise that the FTI can use the recommendations in iteration 1 as a guideline and not a source of truth. Ultimately, however, we feel that providing four overarching design considerations and concrete recommendations drawing on various theories provides valuable knowledge for practical actions for the fashion and textile industry.

To summarize this part of the discussion, we argue that our industry-DAO CDF and overarching blockchain recommendations contribute to practical actions in the fashion and textile industry and as a valuable stepping stone for utilizing DAOs in an enterprise industry context. Nevertheless, it is important to mention that neither is comprehensive in design and has not been tested in practice, so we remind practitioners not to see them as a definitive source of truth, but as subject to the specific context of this thesis.

6.4 Suggestions for Future Research

Even though our thesis has provided valuable insights into DAOs in an enterprise industry context, many unknowns are still surrounding the domain. Consequently, we call for further research on DAOs in an enterprise industry context. Researchers may utilize our thesis's findings and the industry-DAO CDF as a possible venue for future research. A key direction could be to extend the framework with other theories or include additional granularity, e.g., a list of appropriate design choices for each category and its implications. Likewise, the industry-DAO CDF merely concerns what we define as phase 1 and phase 2, and further research is needed to explore the subsequent phases and maturity of DAOs, both theoretical and empirical. Once more industry-DAOs begin to form, we suggest exploring and researching their distinct characteristics to create a categorization similar to the work done by Ziegler & Welpe (2022). Lastly, we advocate for testing the industry-DAO CDF in the fashion- and textile industry to evaluate its feasibility and possibly identify advantages and disadvantages. The next step is to expand the rigorous evaluation in other industries and contexts.

Besides the recommendations of building on the research of this thesis, we recognize that our work only touches the surface of the topic. As a result, we have outlined what we consider to be some of the most critical general research agendas concerning blockchain in the FTI and DAOs below in Table 8.

Table 8 - Suggestion for Future Research

Agenda	**Description**
Blockchain in the fashion- and textile industry	Extend research with empirical field research on the application and utilization of blockchain in the fashion- and textile industry, including creating data standards.
Circular supply chain	Examine the requirements and feasibility of utilizing blockchain for a circular supply chain in the FTI.
DAO performance	A thorough analysis of the performance of DAOs as a new form of organization and how this compares to traditional organizations, including their impact on business models, collaboration and addressing the proposed benefits of a DAO, such as minimizing agency issues.
DAO scalability	Explore the timing, nature, and causes of scalability issues to provide additional clarity and effectiveness in DAOs design.
DAO empirical analysis	Extend research with empirical field research and analysis of DAOs, particularly their decentralization and democratization degree.
DAO frameworks	Future research should prioritize empirical validation of various DAO frameworks and their components, e.g., voting systems, and incentive mechanisms, through rigorous testing in real-world scenarios

7 Conclusion

This thesis has examined the potential of a DAO to govern an industry-wide blockchain solution in the fashion- and textile industry (FTI). Blockchain shows great potential in the FTI, particularly for providing traceability and transparency throughout their supply chains, enabling an innovative way of addressing compliance mandates and new business models (e.g., Circular economy). However, the majority of the FTI lack the necessary capabilities or resources to adopt blockchain effectively. Moreover, fully realizing the value potential of blockchain entails that most industry actors adopt its use and ideally employ the same or a standard solution to reduce complexity and increase effectiveness. As a result, the FTI faces a significant challenge in defining and governing a blockchain solution that encompasses the entire industry, partly due to the industry being characterized by heterogeneous actors that are untrusted and, in many cases, direct competitors. To address this challenge, we formulated our main research question and initial sub-questions as follows:

How should an industry-wide blockchain solution in the fashion- and textile industry be governed?

- What potential does blockchain technology pose in the fashion- and textile industry?
- What can we learn from current enterprise blockchain applications?
- What is a Decentralized Autonomous Organization, and how does it compare to cooperativism?
- How can DAOs be used to govern an industry-wide blockchain solution?

To provide a reasonable answer to the abovementioned, we performed a literature review to identify the current state of blockchain and Decentralized Autonomous Organizations and any literature that could be relevant. Key theoretical and conceptual themes were examined, such as cooperativism, blockchain in the fashion industry, DAOs in enterprises, and governance aspects. From our literature review, we concluded that our first and second sub-question was adequately answered (see Chapter 2). We furthermore observed how DAO and cooperative principles theoretically show great potential as a means of governing an industry-wide blockchain solution. As a result, we adjusted our sub-questions to the following:

- What blockchain design considerations are relevant for an industry-wide blockchain solution in the fashion- and textile industry?
- How should a DAO be designed to govern an industry-wide blockchain solution?

To answer these questions, we had to define our research methodology. This would define our research paradigm and its resulting implications on the research philosophy, the theory development, methodological choices, and the research strategy applied. The design science research paradigm guided the research, and we conducted an iterative exploratory and qualitative research process. We embarked on three design iterations using the Design Science Research Methodology (DSRM). These three iterations were incremental, and each started with an objective of solution after the first iteration was reiterated based on the previous evaluation.

The analysis summary highlights our finalized IS artifact, industry-DAO CDF, produced from these three iterations and consists of what we believe are seven indispensable core design categories for the FTI: (1) purpose, (2) membership, (3) Form, Roles, and Structure, (4) Tokenomics, (5) Voting Systems, (6) Accountability and Conflicts, and (7) Operations and Development. Consequently, we advocate that an industry-wide blockchain solution in the fashion- and textile industry should be governed by a DAO and, more specifically, based on our industry-DAO CDF with the specific suggestions provided by the thesis. The framework is tailored to the fashion- and textile industry, aimed at establishing trustless governance and ownership to ultimately facilitate the development and governing of an industry-wide blockchain solution. That said, our findings also imply that the industry-DAO does not have to limit itself to a single blockchain solution. Instead, we consider a potential in which it can be utilized in the fashion- and textile industry to enable a new era of digital business strategy by creating a multifaceted blockchain ecosystem, enabling a new form of governance.

Furthermore, our thesis contributes to academia by providing substantial knowledge and a tangible framework for DAOs in an enterprise context. Specifically, the FTI and other researchers may utilize our seven core design categories to facilitate governance and ownership control when using, innovating, or adapting new blockchain technology to increase their traceability and transparency. Moreover, researchers and practitioners can leverage the knowledge produced by this thesis and specifically our seven core design categories to augment the DAO domain.

The application of an industry-DAO in the fashion- and textile industry could ultimately enable a new era of trustless governance and ownership. The regulatory requirements experienced by the fashion- and textile industry might just be the first of many industries. To that end, the use of DAOs designed based on the industry-DAO CDF might become increasingly relevant in the future.

8 References

Agrawal, T. K., Kumar, V., Pal, R., Wang, L., & Chen, Y. (2021). Blockchain-based framework for supply chain traceability: A case example of textile and clothing industry. *Computers & Industrial Engineering*, *154*, 107130. https://doi.org/10.1016/j.cie.2021.107130

Agrawal, T. K., Sharma, A., & Kumar, V. (2018). *Blockchain-Based Secured Traceability System for Textile and Clothing Supply Chain* (pp. 197–208). https://doi.org/10.1007/978-981-13-0080-6_10

Ahmed, W. A. H., & MacCarthy, B. L. (2021). Blockchain-Enabled Supply Chain Traceability in the Textile and Apparel Supply Chain: A Case Study of the Fiber Producer, Lenzing. *Sustainability*, *13*(19), 10496. https://doi.org/10.3390/su131910496

Alves, L., Cruz, E. F., & Rosado Da Cruz, A. M. (2022). Tracing Sustainability Indicators in the Textile and Clothing Value Chain using Blockchain Technology. *2022 17th Iberian Conference on Information Systems and Technologies (CISTI)*, 1–7. https://doi.org/10.23919/CISTI54924.2022.9820241

Andel. (2023). *Andelsbevægelsen - Den store guide*. Andel. https://andel.dk/andelsbevaegelsen/

Andersen, N. T. (2018, April). *Andelsbevægelsen*. Faktalink. https://faktalink.dk/andelsbevaegelsen

Aragon. (n.d.). *About Aragon*. Retrieved April 10, 2023, from https://aragon.org/about-aragon

Argast, A. (2022, November 10). *'Staking' Identities: Looking at the Practicalities of Transforming DAOs Into Co-ops*. Platform Cooperativism Consortium. https://platform.coop/blog/staking-identities-looking-at-the-practicalities-of-transforming-daos-into-co-ops/

Badhwar, A., Islam, S., & Tan, C. S. L. (2023). Exploring the potential of blockchain technology within the fashion and textile supply chain with a focus on traceability, transparency, and product authenticity: A systematic review. *Frontiers in Blockchain*, *6*. https://doi.org/10.3389/fbloc.2023.1044723

Banafa, A. (2022). *Blockchain Technology and Applications*. River Publishers. https://doi.org/10.1201/9781003337393

Bannermanquist, J. (2023). Aragon and Polygon Labs collaborate to boost DAO accessibility. *Cointelegraph*. https://cointelegraph.com/news/aragon-and-polygon-labs-collaborate-to-boost-dao-accessibility

Bankless. (2022). *What's a SubDAO? - An explanation on the most exciting scaling model for DAOs*. https://www.bankless.com/whats-a-subdao

Baskerville, R., Kaul, M., & Story, V. (2017). Establishing Reliability in Design Science Research

Baumgartner, I. (2015). Handling Interpretation and Representation in Multilingual Research: A Meta-study of Pragmatic Issues Resulting from the Use of Multiple Languages in a Qualitative Information Systems Research Work. *The Qualitative Report*. https://doi.org/10.46743/2160-3715/2012.1717

Be, A. (2019). All you need to know about Rep (Reputation). *DAOtalk.Org*. https://daotalk.org/t/all-you-need-to-know-about-rep-reputation/813

Bellavitis, C., Fisch, C., & Momtaz, P. P. (2022). The rise of decentralized autonomous organizations (DAOs): a first empirical glimpse. *Venture Capital*, 1–17. https://doi.org/10.1080/13691066.2022.2116797

BESTSELLER. (2022, April). *TRACING 25 MILLION GARMENTS THROUGH PIONEERING COLLAB*. https://bestseller.com/news/tracing-25-million-garments-through-pioneering-collab

BlockchainBusiness. (2023). *Inspirationskatalog over blockchainløsninger*.

Bloomfield, R., & O'Hara, M. (1999). Market Transparency: Who Wins and Who Loses? *Review of Financial Studies*, *12*(1), 5–35. https://doi.org/10.1093/rfs/12.1.5

Boss, S., & Sifat, I. (2022). *Decentralized Autonomous Organizations and Corporate Agency Theory*. https://www.researchgate.net/publication/364821197_Decentralized_Autonomous_Organizations_and_Corporate_Agency_Theory

Brandenburger, A., & Nalebuff, B. (1996). Co-opetition. 1. A revolutionary mindset that combines competition and cooperation. 2. The game theory strategy that's changing the game of business. In *Industrial Marketing Management*.

Brandenburger, A., & Nalebuff, B. (2021, January). *The Rules of Co-opetition*. Harvard Business Review. https://hbr.org/2021/01/the-rules-of-co-opetition

Brocke, J., Hevner, A., & Maedche, A. (2020). *Introduction to Design Science Research* (pp. 1–13). https://doi.org/10.1007/978-3-030-46781-4_1

Bullón Pérez, J. J., Queiruga-Dios, A., Gayoso Martínez, V., & Martín del Rey, Á. (2020). Traceability of Ready-to-Wear Clothing through Blockchain Technology. *Sustainability*, *12*(18), 7491. https://doi.org/10.3390/su12187491

Buterin, V. (2014). *Ethereum: A Next-Generation Smart Contract and Decentralized Application Platform*. https://ethereum.org/669c9e2e2027310b6b3cdce6e1c52962/Ethereum_Whitepaper_-_Buterin_2014.pdf

Cai, L., Li, Q., & Liang, X. (2022). Introduction to Blockchain Basics. In *Advanced Blockchain Technology* (pp. 3–43).

Cai, W., Wang, Z., Ernst, J. B., Hong, Z., Feng, C., & Leung, V. C. M. (2018). Decentralized Applications: The Blockchain-Empowered Software System. *IEEE Access*, *6*, 53019–53033. https://doi.org/10.1109/ACCESS.2018.2870644

Caldarelli, G., Zardini, A., & Rossignoli, C. (2021). Blockchain adoption in the fashion sustainable supply chain: Pragmatically addressing barriers. *Journal of Organizational Change Management*, *34*(2), 507–524. https://doi.org/10.1108/JOCM-09-2020-0299

CBS. (2022). *IEEE Xplore*. https://www.cbs.dk/en/library/databases/ieee-xplore

Chang, S. E., & Chen, Y. (2020). When Blockchain Meets Supply Chain: A Systematic Literature Review on Current Development and Potential Applications. *IEEE Access*, *8*, 62478–62494. https://doi.org/10.1109/ACCESS.2020.2983601

Claessens, S. (2006). Corporate Governance and Development. *The World Bank Research Observer*, *21*(1), 91–122. https://doi.org/10.1093/wbro/lkj004

Collins, P. (2021). *Code-along | Governance & DAOs*. https://www.youtube.com/watch?v=rD8AxZ_wBA4&ab_channel=Chainlink

Conaty, F. (2021). Abduction as a Methodological Approach to Case Study Research in Management Accounting — An Illustrative Case. *Accounting, Finance & Governance Review*, *27*. https://doi.org/10.52399/001c.22171

Cryptopedia. (2022). *What Does Trustless Mean?* Gemini. https://www.gemini.com/cryptopedia/trustless-meaning-blockchain-non-custodial-smart-contracts

Di Pierro, M. (2017). What Is the Blockchain? *Computing in Science & Engineering*, *19*(5), 92–95. https://doi.org/10.1109/MCSE.2017.3421554

Ding, W. W., Liang, X., Hou, J., Wang, G., Yuan, Y., Li, J., & Wang, F.-Y. (2021). Parallel Governance for Decentralized Autonomous Organizations enabled by Blockchain and Smart Contracts. *2021 IEEE 1st International Conference on Digital Twins and Parallel Intelligence (DTPI)*, 1–4. https://doi.org/10.1109/DTPI52967.2021.9540069

Dmytro, K. (2023). *HOW TO PICK THE RIGHT BLOCKCHAIN PLATFORM FOR DAPP DEVELOPMENT*. https://blaize.tech/article-type/how-to-choose-the-right-blockchain-network-for-your-dapp-development/

Duncan, S. (2023). Blockchain won't die with TradeLens; write it off at your peril. *HFS Research*. https://www.hfsresearch.com/research/blockchain-wont-die-with-tradelens-write-it-off-at-your-peril/

DuPont, Q. (2017). Experiments in Algorithmic Governance: A history and ethnography of "The DAO," a failed Decentralized Autonomous Organization. In *Bitcoin and Beyond* (1st ed.).

ElMessiry, M., & ElMessiry, A. (2018). *Blockchain Framework for Textile Supply Chain Management* (pp. 213–227). https://doi.org/10.1007/978-3-319-94478-4_15

Erhvervsministeriet. (2020). *Mode- og tekstilbranchens økonomiske betydning i Danmark*.

Etikan, I. (2016). Comparison of Convenience Sampling and Purposive Sampling. *American Journal of Theoretical and Applied Statistics*, *5*(1), 1. https://doi.org/10.11648/j.ajtas.20160501.11

Faqir-Rhazoui, Y., Arroyo, J., & Hassan, S. (2021). A comparative analysis of the platforms for decentralized autonomous organizations in the Ethereum blockchain. *Journal of Internet Services and Applications*, *12*(1), 9. https://doi.org/10.1186/s13174-021-00139-6

Fernandez-Carames, T. M., & Fraga-Lamas, P. (2018). A Review on the Use of Blockchain for the Internet of Things. *IEEE Access*, *6*, 32979–33001. https://doi.org/10.1109/ACCESS.2018.2842685

Flemming, A., & Djuric, J. (2022). Co-Ops: The Grandparent of DAOs. *Nasdaq*. https://www.nasdaq.com/articles/co-ops%3A-the-grandparent-of-daos

Fu, B., Shu, Z., & Liu, X. (2018). Blockchain Enhanced Emission Trading Framework in Fashion Apparel Manufacturing Industry. *Sustainability*, *10*(4), 1105. https://doi.org/10.3390/su10041105

Gilson, R. J., & Gordon, J. N. (2003). Controlling Controlling Shareholders. *University of Pennsylvania Law Review*, *152*(2), 785. https://doi.org/10.2307/3313035

Goldkuhl, G. (2012). Pragmatism *vs* interpretivism in qualitative information systems research. *European Journal of Information Systems*, *21*(2), 135–146. https://doi.org/10.1057/ejis.2011.54

Goldsby, C., & Hanisch, M. (2022). The Boon and Bane of Blockchain: Getting the Governance Right. *California Management Review*, *64*(3), 141–168. https://doi.org/10.1177/00081256221080747

Gupta, M. (2020). *Blockchain for dummies* (3rd IBM Edition). John Wiley & Sons, Inc.

Gautam, A. (2020). *Creating transparent supply chains*. https://www.youtube.com/watch?v=LsaXBCeusxg&t=19s&ab_channel=Naturv%C3%A5rdsverketkonferenser%26m%C3%B6ten

Gusenbauer, M., & Haddaway, N. R. (2020). Which academic search systems are suitable for systematic reviews or meta-analyses? Evaluating retrieval qualities of Google Scholar, PubMed, and 26 other resources. *Research Synthesis Methods*, *11*(2), 181–217. https://doi.org/10.1002/jrsm.1378

Hader, M., Tchoffa, D., Mhamedi, A. El, Ghodous, P., Dolgui, A., & Abouabdellah, A. (2022). Applying integrated Blockchain and Big Data technologies to improve supply chain traceability and information sharing in the textile sector. *Journal of Industrial Information Integration*, *28*, 100345. https://doi.org/10.1016/j.jii.2022.100345

Hagiu, A. (2014). Strategic decisions for multisided platforms. *MIT Sloan Management Review*, *55*(2).

Hall, A. (2022). What the History of Democracy Can Teach Us About Blockchain Governance. *The Defiant*. https://thedefiant.io/what-the-history-of-democracy-can-teach-us-about-blockchain-governance

Hansen, H. O. (2011). Andelsselskaber i udvikling : andelsbevægelsens evne til forandring og omstilling i landbrugets udvikling fra den lokale til den "globale landsby." *Handelshøjskolens Forlag*, *1*. https://lf.dk/-/media/lf/om-os/fonde/prisopgave/besvarelse1-henning-otte-hansen.pdf

Hassan, S., & De Filippi, P. (2021). Decentralized Autonomous Organization. *Internet Policy Review*, *10*(2). https://doi.org/10.14763/2021.2.1556

Hevner, March, Park, & Ram. (2004). Design Science in Information Systems Research. *MIS Quarterly*, *28*(1), 75. https://doi.org/10.2307/25148625

Hildebrandt & Brandi. (2017). *Andelsselskabet - Ejerskab for fremtiden*. https://hildebrandtbrandi.com/andelsejerskab/

Holmstrom, B. (1982). Moral Hazard in Teams. *The Bell Journal of Economics*, *13*(2), 324. https://doi.org/10.2307/3003457

Howson, P. (2020). Building trust and equity in marine conservation and fisheries supply chain management with blockchain. *Marine Policy*, *115*, 103873. https://doi.org/10.1016/j.marpol.2020.103873

Hyperledger Fabric. (n.d.). *Hyperledger Fabric Whitepaper*. Retrieved April 28, 2023, from https://www.hyperledger.org/wp-content/uploads/2020/03/hyperledger_fabric_whitepaper.pdf

IBM. (n.d.). *What are smart contracts on blockchain?*

ICAcoop. (n.d.). *Cooperative identity, values & principles*. International Cooperative Alliance. Retrieved March 17, 2023, from https://ica.coop/sites/default/files/2021-11/ICA%20Guidance%20Notes%20EN.pdf

IcaCoop. (2023). *The history of the Co-operative Movement*. International Cooperative Alliance. https://www.ica.coop/en/history-co-operative-movement

Igi Global. (n.d.). *What is Digital Platforms*. Retrieved April 16, 2023, from https://www.igi-global.com/dictionary/digital-platforms/78668

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, *3*(4), 305–360. https://doi.org/10.1016/0304-405X(76)90026-X

Jiang, B., Liu, Y., & Chan, W. K. (2018). ContractFuzzer: fuzzing smart contracts for vulnerability detection. *Proceedings of the 33rd ACM/IEEE International Conference on Automated Software Engineering*, 259–269. https://doi.org/10.1145/3238147.3238177

Jovanovic, M., Kostić, N., Sebastian, I. M., & Sedej, T. (2022). Managing a blockchain-based platform ecosystem for industry-wide adoption: The case of TradeLens. *Technological Forecasting and Social Change*, *184*, 121981. https://doi.org/10.1016/j.techfore.2022.121981

Kelemen, M., & Rumens, N. (2008). *An Introduction to Critical Management Research*. SAGE Publications, Ltd. https://doi.org/10.4135/9780857024336

Keršič, V., Vrečko, A., Vidovič, U., Domajnko, M., & Turkanović, M. (2022). Using Self-Sovereign-Identity principles to prove your worth in Decentralized Autonomous Organizations. *Faculty of Electrical Engineering and Computer Science, University of Maribor, Institute of Informatics, Blockchain Lab:UM, Maribor, Slovenia*. https://perun.pmf.uns.ac.rs/pracner/down/sqamia2022/paper-ker.pdf

Kouhizadeh, M., Saberi, S., & Sarkis, J. (2021). Blockchain technology and the sustainable supply chain: Theoretically exploring adoption barriers. *International Journal of Production Economics*, *231*, 107831. https://doi.org/10.1016/j.ijpe.2020.107831

Kramer, M. P., Bitsch, L., & Hanf, J. (2021). Blockchain and Its Impacts on Agri-Food Supply Chain Network Management. *Sustainability*, *13*(4), 2168. https://doi.org/10.3390/su13042168

Lacity, M. C. (2022). Blockchain: From Bitcoin to the Internet of Value and beyond. *Journal of Information Technology*, *37*(4), 326–340. https://doi.org/10.1177/02683962221086300

Lacity, M. C., & Van Hoek, R. (2021). How Walmart Canada Used Blockchain Technology to Reimagine Freight Invoice Processing. *MIS Quarterly Executive*, 219–233. https://doi.org/10.17705/2msqe.00050

LDCluster. (n.d.). Frivilligt sektorsamarbejde om tekstiler. LDCluster.com. https://ldcluster.com/portfolio-item/frivilligt-sektorsamarbejde-om-tekstiler/#1659610946326-9340a993-25f3

Litan, A. (2022). Maersk IBM TradeLens shut down after ASX cancellation; Ending an Era of Costly Enterprise Blockchain. *Gartner*. https://blogs.gartner.com/avivah-litan/2022/12/02/maersk-ibm-tradelens-shut-down-after-asx-cancellation-end-of-era-of-costly-enterprise-blockchain/

Liu, B. (2021). Overview of the Basic Principles of Blockchain. *2021 International Conference on Intelligent Computing, Automation and Applications (ICAA)*, 588–593. https://doi.org/10.1109/ICAA53760.2021.00108

Liu, L., Zhou, S., Huang, H., & Zheng, Z. (2021). From Technology to Society: An Overview of Blockchain-Based DAO. *IEEE Open Journal of the Computer Society*, *2*, 204–215. https://doi.org/10.1109/OJCS.2021.3072661

Liu, Y., Lu, Q., Zhu, L., Paik, H.-Y., & Staples, M. (2023). A systematic literature review on blockchain governance. *Journal of Systems and Software*, *197*, 111576. https://doi.org/10.1016/j.jss.2022.111576

Lutkevich, B. (n.d.). *coopetition (co-opetition)*. Retrieved April 21, 2023, from https://www.techtarget.com/searchcio/definition/co-opetition

Malaurie-Vignal, M. (2020). Blockchain, intellectual property and fashion. *Journal of Intellectual Property Law & Practice*, *15*(2), 92–97. https://doi.org/10.1093/jiplp/jpaa009

Mardiana, S. (2020). Modifying Research Onion for Information Systems Research. *Solid State Technology*, 1202–1210.

Mattke, J., Maier, C., Hund, A., & Weitzel, T. (2019). How an Enterprise Blockchain Application in the U.S. Pharmaceuticals Supply Chain is Saving Lives. *MIS Quarterly Executive*, *18*(4), 245–261. https://doi.org/10.17705/2msqe.00019

McAfee, A., & Ruane, J. (2022). What a DAO Can — and Can't — Do. *Harvard Business Review*. https://hbr.org/2022/05/what-a-dao-can-and-cant-do

Mishra, D. P., Heide, J. B., & Cort, S. G. (1998). Information Asymmetry and Levels of Agency Relationships. *Journal of Marketing Research*, *35*(3), 277. https://doi.org/10.2307/3152028

Moretto, A., & Macchion, L. (2022). Drivers, barriers and supply chain variables influencing the adoption of the blockchain to support traceability along fashion supply chains. *Operations Management Research*, *15*(3–4), 1470–1489. https://doi.org/10.1007/s12063-022-00262-y

Murray, A., Kuban, S., Josefy, M., & Anderson, J. (2021). Contracting in the Smart Era: The Implications of Blockchain and Decentralized Autonomous Organizations for Contracting and Corporate Governance. *Academy of Management Perspectives*, *35*(4), 622–641. https://doi.org/10.5465/amp.2018.0066

Muscarella, C. J., & Damodaran, A. (1997). Corporate Finance, Theory and Practice. *The Journal of Finance*, *52*(4). https://doi.org/10.2307/2329456

Muzellec, L., Ronteau, S., & Lambkin, M. (2015). Two-sided Internet platforms: A business model lifecycle perspective. *Industrial Marketing Management*, *45*, 139–150. https://doi.org/10.1016/j.indmarman.2015.02.012

Nabben, K., Puspasari, N., Kelleher, M., & Sanjay, S. (2021). Grounding Decentralised Technologies in Cooperative Principles: What Can "decentralised Autonomous Organisations" (DAOs) and Platform Cooperatives Learn from Each Other? *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3979223

Nakamoto, S. (2008). *Bitcoin: A Peer-to-Peer Electronic Cash System*.

Nalebuff, B. J., & Brandenburger, A. M. (1997). Co-opetition: Competitive and cooperative business strategies for the digital economy. *Strategy & Leadership*, *25*(6), 28–33. https://doi.org/10.1108/eb054655

Newsome, J., Shi, E., Song, D., & Perrig, A. (2004). *The Sybil Attack in Sensor Networks: Analysis & Defenses*□.

Nigam, V., Wandler, K., & Minicucci, F. (2022). Governance. *DAO Research Collective.* https://daocollective.xyz/governance/

Nirantar, K., Karmakar, R., Hiremath, P., & Chaudhari, D. (2022). Blockchain based Supply Chain Management. *2022 3rd International Conference for Emerging Technology (INCET)*, 1–8. https://doi.org/10.1109/INCET54531.2022.9824449

Noonan, J., & Doran, P. (2021). *Blockchain's Impact on Consumer's Perspective in the Luxury Fashion Industry: A Position Paper* (pp. 596–606). https://doi.org/10.1007/978-3-030-85447-8_49

Oliveira, L., Zavolokina, L., Bauer, I., & Schwabe, G. (2018). *To Token or not to Token: Tools for Understanding Blockchain Tokens*.

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. *Administration and Policy in Mental Health and Mental Health Services Research*, *42*(5), 533–544. https://doi.org/10.1007/s10488-013-0528-y

Panda, B., & Leepsa, N. M. (2017). Agency theory: Review of Theory and Evidence on Problems and Perspectives. *Indian Journal of Corporate Governance*, *10*(1), 74–95. https://doi.org/10.1177/0974686217701467

Park, A., & Li, H. (2021). The Effect of Blockchain Technology on Supply Chain Sustainability Performances. *Sustainability*, *13*(4), 1726. https://doi.org/10.3390/su13041726

Parker, G. G., Van Alstyne, M. W., & Choudary, S. P. (2016). Platform Revolution. In *W.W. Norton & Company*.

Parton, N. (2021). *Compound Governor*. https://wiki.tally.xyz/docs/compound-governor

Patel Thompson, A., Winn, E., Oates, G., Esber, J., Jin, L., Kanter, M., Mannan, M., Poux, P., Hubbard, S., Moore, S., Deleveaux, S., Scholz, T. R., & Hum, Q. (2022). Toward A More Cooperative Web3. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4302681

Peffers, K., Tuunanen, T., & Niehaves, B. (2018). Design science research genres: introduction to the special issue on exemplars and criteria for applicable design science research. *European Journal of Information Systems*, *27*(2), 129–139. https://doi.org/10.1080/0960085X.2018.1458066

Peffers, K., Tuunanen, T., Rothenberger, M. A., & Chatterjee, S. (2007). A Design Science Research Methodology for Information Systems Research. *Journal of Management Information Systems*, *24*(3), 45–77. https://doi.org/10.2753/MIS0742-1222240302

polarpunklabs. (2022). *Canonical white paper year of 2013 is incorrect. #5469*. https://github.com/ethereum/ethereum-org-website/issues/5469

Pop, S. (2022). *Governance in Review*.

Qin, R., Ding, W., Li, J., Guan, S., Wang, G., Ren, Y., & Qu, Z. (2023). Web3-Based Decentralized Autonomous Organizations and Operations: Architectures, Models, and Mechanisms. *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, 1–10. https://doi.org/10.1109/TSMC.2022.3228530

Rauchs, M., Blandin, A., Bear, K., & McKeon, S. B. (2019). 2nd Global Enterprise Blockchain Benchmarking Study. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3461765

Reijers, W., Wuisman, I., Mannan, M., De Filippi, P., Wray, C., Rae-Looi, V., Cubillos Vélez, A., & Orgad, L. (2021). Now the Code Runs Itself: On-Chain and Off-Chain Governance of Blockchain Technologies. *Topoi*, *40*(4), 821–831. https://doi.org/10.1007/s11245-018-9626-5

Remme, A.-M. R., Stange, S.-M., Fagerstrøm, A., & Lasrado, L. A. (2022). Blockchain-enabled Sustainability Labeling in the Fashion Industry. *Procedia Computer Science*, *196*, 280–287. https://doi.org/10.1016/j.procs.2021.12.015

Ribeiro, F. A., & Brito, M. A. (2022). Blockchain Technology Applications: Enhancing Fashion Supply Chain Sustainability. *2022 17th Iberian Conference on Information Systems and Technologies (CISTI)*, 1–4. https://doi.org/10.23919/CISTI54924.2022.9820395

Rikken, O., Janssen, M., & Kwee, Z. (2019). Governance challenges of blockchain and decentralized autonomous organizations. *Information Polity*, *24*(4), 397–417. https://doi.org/10.3233/IP-190154

Robey, A. (2022, January 13). *WHAT CO-OPS AND DAOS CAN LEARN FROM EACH OTHER*. https://www.fwb.help/editorial/what-co-ops-and-daos-can-learn-from-each-other

Saberi, S., Kouhizadeh, M., Sarkis, J., & Shen, L. (2019). Blockchain technology and its relationships to sustainable supply chain management. *International Journal of Production Research*, *57*(7), 2117–2135. https://doi.org/10.1080/00207543.2018.1533261

Santana, C., & Albareda, L. (2022). Blockchain and the emergence of Decentralized Autonomous Organizations (DAOs): An integrative model and research agenda. *Technological Forecasting and Social Change*, *182*, 121806. https://doi.org/10.1016/j.techfore.2022.121806

Sardius. (2022, June 25). *How DAOs can Benefit from Co-op Best Practices*. https://mirror.xyz/sardius.eth/caDTIJ7XL25SU8qm-6M6FE_IJUIVh7iLBkHr7eEfAvw

Saunders, M. N., Lewis, P., & Thornhill, A. (2019). *Research methods for business students* (8th ed.).

Saurabh, K., Rani, N., & Upadhyay, P. (2023). Towards blockchain led decentralized autonomous organization (DAO) business model innovations. *Benchmarking: An International Journal*, *30*(2), 475–502. https://doi.org/10.1108/BIJ-10-2021-0606

Scholz, T. (2016). *Platform Cooperativism: Challenging the Corporate Sharing Economy*. https://rosalux.nyc/platform-cooperativism-2/

Shrimali, B., & Patel, H. B. (2022). Blockchain state-of-the-art: architecture, use cases, consensus, challenges and opportunities. *Journal of King Saud University - Computer and Information Sciences*, *34*(9), 6793–6807. https://doi.org/10.1016/j.jksuci.2021.08.005

Siegel, D. (2023). Understanding the DAO Attack. *Coindesk*.

Sotatek. (2022). *A Brief Overview Of DAO Platform: Why Does It Matter?* https://www.sotatek.com/a-brief-overview-of-dao-platform-why-does-it-matter/

Stevens, R. (2022). *What Is Tokenomics and Why Is It Important?* https://www.coindesk.com/learn/what-is-tokenomics-and-why-is-it-important/

Strauf, F. (2022). *Tokenomics 101: DAOs*. Tokenomicsdao. https://tokenomicsdao.xyz/blog/tokenomics-101/tokenomics-101-daos/

Szabo, N. (1996). Smart Contracts: Building Blocks for Digital Free Markets. *Extropy Journal of Transhuman Thought, 16.*

TFL. (2018, April 24). What is Blockchain and What Can it Do for the Fashion Industry? *The Fashion Law*. What is Blockchain and What Can it Do for the Fashion Industry?

Tikhomirov, S., Voskresenskaya, E., Ivanitskiy, I., Takhaviev, R., Marchenko, E., & Alexandrov, Y. (2018). SmartCheck. *Proceedings of the 1st International Workshop on Emerging Trends in Software Engineering for Blockchain*, 9–16. https://doi.org/10.1145/3194113.3194115

Toppin, J. (2022). *DAOs Aren't A Fad — They're A Platform*. https://www.forbes.com/sites/jeffkauflin/2022/02/03/daos-arent-a-fad-theyre-a-platform/?sh=7f059d3d19d0

Trabucchi, D., Moretto, A., Buganza, T., & MacCormack, A. (2020). Disrupting the Disruptors or Enhancing Them? How Blockchain Reshapes Two-Sided Platforms. *Journal of Product Innovation Management*, *37*(6), 552–574. https://doi.org/10.1111/jpim.12557

Tripathi, G., Tripathi Nautiyal, V., Ahad, M. A., & Feroz, N. (2021). *Blockchain Technology and Fashion Industry-Opportunities and Challenges* (pp. 201–220). https://doi.org/10.1007/978-3-030-69395-4_12

Venkatesh, V. G., Kang, K., Wang, B., Zhong, R. Y., & Zhang, A. (2020). System architecture for blockchain based transparency of supply chain social sustainability. *Robotics and Computer-Integrated Manufacturing*, *63*, 101896. https://doi.org/10.1016/j.rcim.2019.101896

Viriyasitavat, W., & Hoonsopon, D. (2019). Blockchain characteristics and consensus in modern business processes. *Journal of Industrial Information Integration*, *13*, 32–39. https://doi.org/10.1016/j.jii.2018.07.004

Wang, B., Luo, W., Zhang, A., Tian, Z., & Li, Z. (2020). Blockchain-enabled circular supply chain management: A system architecture for fast fashion. *Computers in Industry*, *123*, 103324. https://doi.org/10.1016/j.compind.2020.103324

Wang, S, Ding, W., Li, J., Yuan, Y., Ouyang, L., & Wang, F.-Y. (2019). Decentralized Autonomous Organizations: Concept, Model, and Applications. *IEEE Transactions on Computational Social Systems*, *6*(5), 870–878. https://doi.org/10.1109/TCSS.2019.2938190

Wang, S., Ouyang, L., Yuan, Y., Ni, X., Han, X., & Wang, F.-Y. (2019). Blockchain-Enabled Smart Contracts: Architecture, Applications, and Future Trends. *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, *49*(11), 2266–2277. https://doi.org/10.1109/TSMC.2019.2895123

Wegrzyn, K., & Wang, E. (2021). *Types of Blockchain: Public, Private, or Something in Between*. https://www.foley.com/en/insights/publications/2021/08/types-of-blockchain-public-private-between

Wilson, C. (1989). Adverse Selection. In *Allocation, Information and Markets* (pp. 31–34). Palgrave Macmillan UK. https://doi.org/10.1007/978-1-349-20215-7_2

Wohlin, C. (2014). Guidelines for snowballing in systematic literature studies and a replication in software engineering. *Proceedings of the 18th International Conference on Evaluation and Assessment in Software Engineering*, 1–10. https://doi.org/10.1145/2601248.2601268

Xinyi, Y., Yi, Z., & He, Y. (2018). Technical Characteristics and Model of Blockchain. *2018 10th International Conference on Communication Software and Networks (ICCSN)*, 562–566. https://doi.org/10.1109/ICCSN.2018.8488289

Yanisky-Ravid, S., & Monroy, G. (2022). The Promised Land: Blockchain and the Fashion Industry. *Brooklyn Law Review*, *87*(2). https://brooklynworks.brooklaw.edu/blr/vol87/iss2/4

Zheng, Z., Xie, S., Dai, H., Chen, X., & Wang, H. (2017). An Overview of Blockchain Technology: Architecture, Consensus, and Future Trends. *2017 IEEE International Congress on Big Data (BigData Congress)*, 557–564. https://doi.org/10.1109/BigDataCongress.2017.85

Ziegler, C., & Welpe, I. M. (2022). A Taxonomy of Decentralized Autonomous Organizations. ICIS 2022 Proceedings. 1.

9 Appendices

Appendix A: Overview of search strings used for literature review

String		**IEEE Xplore**
1	DAO	"Abstract": "DAO" OR "Abstract": "DAOs" OR "Abstract": "Decentralized Autonomous Organization" OR "Abstract": "Decentralized Autonomous Organizations"
2	DAO AND (Fashion OR Governance OR Platform OR Coops)	("Abstract": "DAO" OR "Abstract": "DAOs" OR "Abstract": "Decentralized Autonomous Organization" OR "Abstract": "Decentralized Autonomous Organizations") AND ("Abstract": "Fashion" OR "Abstract": "Textile" OR "Abstract": "Governance" OR "Abstract": "Platform" OR "Abstract": "Platforms" OR "Abstract": "Coops" OR "Abstract": "Coop" OR "Abstract": "Cooperatives" OR "Abstract": "Co-operative" OR "Abstract": "Co-operatives" OR "Abstract": "Cooperativism")
3	Blockchain AND (Coops or Fashion)	"Abstract": "Blockchain" AND ("Abstract": "Fashion" OR "Abstract": "Textile" OR "Abstract": "Coops" OR "Abstract": "Coop" OR "Abstract": "Cooperatives" OR "Abstract": "Co-operative" OR "Abstract": "Co-operatives" OR "Abstract": "Cooperativism")
4	Coops AND Fashion	("Abstract": "Coops" OR "Abstract": "Coop" OR "Abstract": "Cooperatives" OR "Abstract": "Co-operative" OR "Abstract": "Co-operatives" OR "Abstract": "Cooperativism")) AND ("Abstract": "Fashion" OR "Abstract": "Textile")

String		**Google Scholar**
1	DAO	allintitle: "DAO" OR "DAOs" OR "Decentralized Autonomous Organization" OR "Decentralized Autonomous Organizations"
2	DAO AND (Fashion OR Governance OR Platform OR Coops)	allintitle:("DAO" OR "DAOs" OR "Decentralized Autonomous Organization" OR "Decentralized Autonomous Organizations") AND ("Fashion" OR "Textile" OR "Governance" OR "Platform" OR "Platforms" OR "Coops" OR "Coop" OR "Cooperatives" OR "Co-operative" OR "Co-operatives")

3	Blockchain AND (Coops or Fashion)	allintitle:"Blockchain" AND ("Fashion" OR "Textile" OR "Coops" OR "Coop" OR "Cooperatives" OR "Co-operative" OR "Co-operatives" OR "Cooperativism")
4	Coops AND Fashion	allintitle:("Coops" OR "Coop" OR "Cooperatives" OR "Co-operative" OR "Co-operatives" OR "Cooperativism") AND ("Fashion" OR "Textile")

String		**Scopus**
1	DAO	TITLE-ABS (“DAO” OR “DAOs" OR "Decentralized Autonomous Organization" OR "Decentralized Autonomous Organizations")
2	DAO AND (Fashion OR Governance OR Platform OR Coops)	TITLE-ABS (DAO OR DAOs OR "Decentralized Autonomous Organization" OR "Decentralized Autonomous Organizations") AND TITLE-ABS (Fashion OR Textile OR Governance OR Platform OR Platforms OR Coops OR Coop OR Cooperatives OR Co-operative OR Co-operatives OR Cooperativism)
3	Blockchain AND (Coops or Fashion)	TITLE-ABS(Blockchain) AND TITLE-ABS(Fashion OR Textile OR Coops OR Coop OR Cooperatives OR Co-operative OR Co-operatives OR Cooperativism)
4	Coops AND Fashion	TITLE-ABS(Coops OR Coop OR Cooperatives OR Co-operative OR Co-operatives OR Cooperativism) AND TITLE-ABS(Fashion OR Textile)

Appendix B: Textile Genesis Project

How the Project Works

- TextileGenesis is a web-based cloud solution designed specifically for the fashion industry to trace fibres as they move along the supply chain.
- Traceability is the ability to trace all processes from procurement of raw materials through production, consumption and disposal, and provides data on when, where and who made the product.
- All products are made of multiple fibres that go through a spinning, weaving, dyeing and manufacturing process. TextileGenesis' systems register and verify transactions between these processes.
- The system creates a digital twin ('Fibercoin') of every kg of branded or certified material at the source and tracks it across the entire textile value chain, thereby eliminating the need for any PDF/paper-based traceability approaches.
- No material can be double or triple-counted, thus reducing the counterfeiting or fraud risk across the supply chain – enabling a 'closed loop' traceability system.
- The system does not rely on large servers (unlike some blockchain technologies such as cryptocurrency-based platforms) and is therefore relatively energy efficient.

Source: https://texfash.com/update/new-bestseller-project-to-trace-25-million-garments-this-year

Appendix C: Interview Transcriptions

See the attached file, Appendix C. Within the transcriptions are each individual interview with the name of the company. In the case of Deloitte there is a Deloitte1 and a Deloitte2.

Appendix D: Operationalization and Coding Tables

See the attached file, Appendix D.

Appendix E: MakerDAO

See the attached file, Appendix E.