Electronic Markets (2025) 35:98
https://doi.org/10.1007/s12525-025-00832-5

RESEARCH PAPER

Beyond disintermediation: A multiple case study of emerging intermediary roles in blockchain applications

Simon Feulner[1,3] · **Tobias Guggenberger**[2,3] · **Jens-Christian Stoetzer**[2,3] · **Nils Urbach**[1,3]

Received: 3 January 2025 / Accepted: 1 September 2025

Abstract
Since the introduction of blockchain technology, both academic and practical discourse has explored its impact on intermediation. Early research emphasized the notion of disintermediation, removing traditional intermediaries through decentralized trust and automated coordination. Yet, more recent studies highlight that blockchain systems often give rise to new forms of intermediation. These roles may not resemble legacy intermediaries but nonetheless fulfil essential functions such as compliance, governance, and technical integration. Based on a multiple case study, we investigate how and why such re-intermediation occurs in blockchain ecosystems. Our analysis identifies three recurring drivers, system integrity and resilience, boundary and interface management, and governance efficiency, that structurally necessitate new coordination layers. This study thereby contributes to electronic markets and blockchain literature by offering a refined conceptualization of intermediation dynamics in distributed systems.

Keywords Disintermediation · Re-intermediation · Blockchain · Multiple case study

JEL Classification L1 · M0 · O30

Introduction

Over the last several years, researchers and practitioners alike have debated how emerging technologies shape society, businesses, and individual behavior (Chong et al., 2019). Among these emerging technologies is blockchain, which has attracted significant attention due to its purported disruptive potential for business models and industries (Guggenberger, Stoetzer et al. 2021). Due to the decentralized nature of blockchain, participants can transact directly without relying on a central, trusted authority. As a result, many blockchain applications emphasize the potential removal of intermediaries, commonly referred to as *disintermediation*, as a defining feature of the technology's impact on value creation and business operations (Chalmers et al., 2021). A prominent early example of this is Bitcoin. Designed as a peer-to-peer electronic cash system, Bitcoin enables users to transfer value without relying on banks or payment service providers. Transactions are validated collectively by a decentralized network of miners through a consensus mechanism, eliminating the need for central clearinghouses or institutional gatekeepers. In this sense, Bitcoin demonstrates the disintermediating potential of blockchain technology: It allows direct exchange between parties based solely on software protocols and cryptographic trust.

Yet, as research and practical implementations have matured, it became clear that even though blockchain may displace certain legacy intermediaries, new ones frequently emerge (Feulner et al., 2022; Zeiß et al., 2024). This process, termed *re-intermediation* (Giaglis et al., 2002), occurs when evolving structural or contextual factors necessitate new forms of coordination and oversight, thereby reintroducing intermediary roles that were absent or not required in the original blockchain design. Hence, while the technology can reduce some forms of intermediation, it may

Responsible Editor: Juho Lindman

✉ Jens-Christian Stoetzer
jens-christian.stoetzer@fit.fraunhofer.de

[1] ditlab, Frankfurt University of Applied Sciences, Niebelungstr. 1, 60318 Frankfurt a.M., Germany

[2] FIM Research Center, University of Bayreuth, Wittelsbacherring 10, 95447 Bayreuth, Germany

[3] Fraunhofer FIT, Wittelsbacherring 10, 95447 Bayreuth, Germany

Published online: 16 November 2025

simultaneously engender new roles or organizations to handle complex tasks. In the case of Bitcoin, the rise of centralized cryptocurrency exchanges exemplifies this dynamic vividly. Although users can technically transact and store assets independently using private wallets, the majority rely on platforms such as Coinbase or Binance to access the network. These exchanges serve as custodians, fiat gateways, and compliance intermediaries by handling onboarding, regulatory checks, and asset management. As such, they reintroduce many of the coordination and trust functions that Bitcoin initially sought to eliminate, albeit in a new institutional form. This example illustrates that the disappearance of traditional intermediaries does not necessarily equate to the disappearance of intermediation; as such, it often transforms rather than vanishes. As a result, the notion of *complete* disintermediation has been called into question (Feulner et al., 2022; Zeiß et al., 2024).

This conversation about intermediation and re-intermediation resonates with a market- and role-based perspective on intermediaries. Intermediaries, by definition, "bridge the incompatibilities between two (market) sides involved in a transaction" (Wigand, 2020, p. 39), handling transaction administration and execution (Bhargava et al., 2000; Datta & Chatterjee, 2008; Grover & Teng, 2001). While the concept of disintermediation dates back to the advent of electronic markets (Giaglis et al., 2002; Wigand, 2020), blockchain's decentralized structure revitalized academic and practical interest in whether intermediaries could be drastically reduced or transformed. However, with the increasing occurrence of *re-intermediation*, scholars and practitioners need a refined understanding of how blockchain reshapes the functions and presence of intermediaries in various ecosystems.

Closely related to this market- and role-based perspective, governance research focuses on the enforcement of rules between different entities. The relationship between such entities is regulated by governance structures (Rensmann & Klein, 2011), which can also be installed by intermediaries (Mahnke et al., 2008). Hence, while the intermediation perspective focuses on the role of an organization in the market, governance focuses on the management of relationships between and within organizations. While research on blockchain governance structures became increasingly focal in IS literature (Beck et al., 2018; Liu et al., 2023; Lumineau et al., 2021), only a few researchers (Feulner et al., 2022; Zeiß et al., 2024) have yet used an intermediation-based perspective to analyze the impact of blockchain technology on market intermediation, i.e., Zeiß et al. (2024) outline a re-intermediation scenario for traditional financial intermediaries in the context of cryptocurrencies. Further, Feulner et al. (2022) provide an overview of different intermediation scenarios in the context of blockchain technology. Yet, these studies offer limited insights into the specific conditions under which new intermediaries emerge and how these roles differ from traditional gatekeepers. Moreover, there is a lack of evidence on how different types of blockchain architectures, stakeholder interactions, and regulatory pressures influence different intermediation scenarios (Chalmers et al., 2021).

Addressing this research gap will help organizations identify how blockchain might reshape their existing business models or market roles, and it will clarify the fate of institutional intermediaries confronted with blockchain's evolving functionality (Fridgen et al., 2021). Several scholars highlight the need to explore how blockchain technology influences institutional intermediaries' responsibilities (Alt, 2020; Rossi et al., 2019) and whether new models of intermediation, and re-intermediation, are likely to emerge. In response to these calls, we aim to conceptualize how blockchain reconfigures intermediaries across distinct use cases, paying special attention to the factors that create novel intermediaries. Therefore, we pose the following research question:

> *How and under what conditions do blockchain solutions give rise to new forms of intermediation?*

To address our research question, we adopt a multiple case study approach (Dubé & Paré, 2003; Yin, 2009). This method is well-suited for investigating the "what," "how," and "why" of a phenomenon in real-world settings where researchers have little control over events. We follow an interpretive case study methodology to analyze two distinct blockchain use cases, each illustrating how different forms of intermediation and re-intermediation manifest in practice. In particular, we explore how blockchain transforms, and sometimes reinvents, intermediaries' roles. From this within-case and cross-case analysis, we develop an integrative perspective on re-intermediation that highlights the interplay among governance structures, compliance drivers, and technological features in shaping new intermediary roles. Our findings thus challenge a simplistic narrative of disintermediation and shed light on the nuanced ways in which intermediaries continue to shape and are reshaped by blockchain systems.

The remainder of this paper is structured as follows. The "Theoretical foundation" section introduces different intermediation perspectives on blockchain technology and sets the stage for the subsequent analysis. The "Method" section details our methodological approach and case selection. The "Findings" section presents the findings from our two cases, examining how intermediaries evolve within each context. Based on these findings, we propose an updated theoretical framework that accounts for re-intermediation in blockchain environments. We discuss these findings in the "Discussion" section. Finally, we provide a conclusion to our work in the "Conclusion" section.

Theoretical foundation

Blockchain technology as an enabler for disintermediation

In 2008, the Bitcoin whitepaper introduced the concept of blockchain technology (Nakamoto, 2008). Blockchain technology is a decentralized network that capitalizes on cryptographic mechanisms to prevent the distributed ledger from tampering. While the related term Distributed Ledger Technologies also exists, we follow the terminology of blockchain technology, which incorporates all technologies that build on the following principles (Chanson et al., 2019).

The technological fundament is a chain of blocks, whereas each block stores data (e.g., information on transactions between two nodes) and refers to the previous block. Blockchain technology uses hash functions to encrypt the stored data on each block. In contrast to centralized ledgers, the data is stored separately by each participant in the network of connected computers. To ensure the chronological order of the blockchain, a consensus mechanism verifies information before the network adds the proposed new block to the chain (Nakamoto, 2008; Rossi et al., 2019). The consensus mechanism ensures the consent of all participants about the state of the ledger within the network. Thus, all participants in the network agree on the authenticity and validity of the data before the nodes add a new block to the chain (Chanson et al., 2019). This distributed consensus without a central authority enables blockchains to operate independently of central intermediaries which previously served as coordinators between entities. Even though the use case of the initial Bitcoin blockchain technology is limited to the peer-to-peer cryptocurrency network, developers made use of the capability to ensure consensus without a central intermediary to invent applications across industries. Application areas now include finance, supply chain management, identity management, logistics, energy, and mobility (Chong et al., 2019). Attracted by the public discourse about the potential decentralized applications, operating without a central intermediary (Gartner, 2021), many companies started investing in blockchain technology to gain competitive advantages in the market. Yet, research and practice still need to address various challenges to bring the technology to its full potential (Rossi et al., 2019). These challenges include the scalability and privacy of blockchain. However, more recent achievements, e.g., in applied cryptography, might soon lower the barriers for productive systems (Guggenberger et al., 2021a, 2021b). Subsequently, the number of productive blockchain use cases remains low (Guggenberger, Stoetzer et al. 2021; Rossi et al., 2019).

This remains in stark contrast to the expectation formulated by both practice and academia that peer-to-peer transactions without a central trust-building institution will lead to widespread disintermediation of central intermediaries (Chalmers et al., 2021; Pereira et al., 2019; Schlecht et al., 2020). Henceforth, more recently scholars proposed a more specific view on the disintermediation capabilities of blockchain technology (Chong et al., 2019).

Intermediation perspectives on blockchain technology

Early research on blockchain technology and its impact on markets underpinned the hypothesis of a threat of disintermediation (Schlecht et al., 2020). Disintermediation generally describes the removal of established intermediaries from the market process (Wigand, 2020). This scenario can be explained through a decline in transaction costs to a level where a market clears itself (Giaglis et al., 2002) or the extrusion through new technologies (Chircu & Kauffman, 1999). Research on blockchain technology indicates that blockchain could reduce transaction costs and information asymmetries in markets, e.g., through the automation of process steps in pre-defined smart contracts (e.g., the automated payment of insurances in cars) (Cisar et al., 2025). For instance, Ahluwalia et al. (2020) indicated that the decentralized character of blockchain technology might replace central institutional intermediaries in startup finance through reduced transaction costs.

However, contrary to the anticipated outcome of complete disintermediation, another stream of research proposed a more specific view on the disintermediation capabilities of blockchain technology (Chong et al., 2019). Thereby, scholars proposed that blockchain often leads to the emergence of hybrid intermediation models, where some intermediaries might be eliminated but simultaneously new intermediary roles are established. Research on hybrid intermediation models emphasizes the dependency on off-chain data and the limitations of smart contracts in dealing with complex transactions requiring flexibility or human adjudication (Feulner et al., 2022; Tan et al., 2021). Furthermore, hybrid intermediation models, where traditional intermediaries adopt blockchain to enhance efficiency rather than being replaced entirely, are consistently observed across case studies (Abbatemarco et al., 2020; Purusottama & Trilaksono, 2024). For instance, Boreiko and Vidusso highlight the emergence of new intermediaries, such as Initial Coin Offering (ICO) rating platforms, that address moral hazard and information asymmetry in blockchain ecosystems (Boreiko & Vidusso, 2019).

Thus, this stream of research builds upon the idea of *re-intermediation* as an alternative scenario to disintermediation (Chircu & Kauffman, 1999; Giaglis et al., 2002; Sarkar

et al., 1998). *Re-intermediation* occurs when a priorly disintermediated institutional intermediary finds a new position or function in the market. Such behavior might include further market differentiation (e.g., providing value-added services) or concentrating on a market niche (Fridgen et al., 2021). More recent examples of such work include Zeiß et al. (2024) who proposed such an outcome for traditional financial institutions within the crypto asset ecosystem. Thereby, such scenarios could lead to the contradicting outcome, that even though a decentralized blockchain is implemented, centralized intermediaries emerge again as gatekeepers to the networks. However, as scholars suggest the re-intermediation case to apply for their work, they often fail short to provide a deeper understanding of why re-intermediation occurs, and which trajectories lead towards such scenarios.

Method

To investigate the impact of blockchain technology on intermediation, we have adopted the case study methodology, as it allows us to draw insights from real-life situations (Yin, 2009). We aim to generate relevant propositions through an interpretative, exploratory case study (Yin, 2009), which is well-suited for extracting theory from complex practical problems (Levina and Ross 2003). Since various types of blockchain technologies are available, each with unique technological capabilities, no single case can fully explain the diverse effects of blockchain technology on intermediation (Yin, 2009). Therefore, we have opted for a multiple case study approach.

We first reviewed related literature to determine whether any existing hypotheses or theories exist before selecting and collecting data. Even though we did not find a specific theory to explain intermediation through blockchain technology, we identified literature from electronic markets, providing a conceptual background for our research. Next, we proceeded to our case selection, on which we elaborate in the following.

Case selection for our multiple case study

Glaser and Strauss (2017) highlight the importance of carefully choosing cases to answer the stated research question. Thus, we follow their proposal of theoretical sampling of cases.

As blockchain technology incorporates a variety of technical architectures and application fields (Rossi et al., 2019), each case may affect intermediation differently. We therefore selected two contrasting cases that allow for both literal and theoretical replication (Yin, 2009). To ensure empirical relevance, we focused on use cases that were in productive operation at the time of data collection. While many blockchain projects remain in proof-of-concept stages, only operational systems can reveal sustained effects on intermediaries (Drnevich & Croson, 2013). Existing research describes the finance and supply chain industry as the most promising sectors for blockchain use cases (Chong et al., 2019). By selecting one case from each, we capture two contrasting intermediation environments and observe how blockchain infrastructures mediate their transformation.

The first case, MakerDAO, represents the financial sector, where intermediation traditionally involves actors such as banks, clearing houses, or rating agencies. The second case, TradeLens, represents the supply chain sector, which is traditionally shaped by freight forwarders, port operators, and customs authorities. Both cases involve blockchain-based reconfigurations of intermediation, but with notable differences: MakerDAO is built on a public blockchain (Ethereum) using proof-of-stake and decentralized governance, while TradeLens relies on a permissioned blockchain (Hyperledger Fabric) operated by a consortium of established firms. These structural differences shape how new forms of intermediation emerge and are governed. Table 1 presents a summary of both cases.

Data collection

For the data collection in our multiple case study, we followed the recommendation of Yin (2009) to incorporate different data types. Using and triangulating different evidence sources help us generate theory from data. We started our data collection by gathering public information and documentation about each case. Next, we approached relevant experts in the cases with a large and broad range of experiences and different positions. Thus, we gathered a comprehensive view of perspectives in our data sample. We carried out eight interviews over a period of 3 months: three related to the case of TradeLens and five to the case of MakerDAO. The different number of interviews reflects both the varying levels of accessibility to knowledgeable stakeholders and the different complexities of the cases. In the case of TradeLens, the three interviews provided consistent insights across interviewees and were complemented by rich secondary data, indicating that data saturation had been reached. In contrast, the MakerDAO case required five interviews due to the broader and more decentralized stakeholder structure, which necessitated a wider range of perspectives to reach conceptual saturation.

Each interview was conducted by either one or multiple researchers from our team. Our questions for the interviewees followed a semi-structured questionnaire, which was adapted for each case and interview to meet the appropriate perspective of the interviewee. This approach ensured the interviewees provided wide-ranging, detailed answers (Yin,

Table 1 Case overview

Case	*Industry*	*Started*	*Description*
MakerDAO	Finance	2017	MakerDAO aims to establish a stable decentralized currency based on the Ethereum blockchain. MakerDAO provides a protocol, using a multi-collateral system, to peg the cryptocurrency to the US Dollar. The protocol follows a decentralized governance structure with no central entity controlling the protocol. The project was started by a foundation that helped to bootstrap the MakerDAO but ultimately dissolved in 2021 to further advance the vision of a fully stable and decentralized currency
TradeLens	Supply Chain	2018	TradeLens was introduced to the market by IBM and Maersk in 2018. The vision of both companies was to connect the global supply chain industry through a blockchain-based IS. Over the last years, the system was able to integrate the majority of global players in the supply chain industry, ranging from shippers, freight forwarders, freight ports, and intermodal operators to customs authorities in various countries. Yet, in late 2022 the providers decided to discontinue the project over concerns regarding the long-term commercial viability

2009). The interviews lasted between 35 and 58 min. Each interview was transcribed, which resulted in a comprehensive set of 91 pages of interview transcripts. To enhance the internal validity of the analysis, interview data were triangulated with secondary sources such as repositories, corporate websites, discussion forums, and social networks (Eisenhardt, 1989). Table 2 presents an overview of all data used in our research, including observations from recordings and documentation.

*Type: *D*, document/recording; *E*, expert interview

Table 2 Overview of collected data

Case	*Type code**	***Position***	***Description***	***Data***	***Relevant experience***
TradeLens	E1.1	Professor	Involved in a leadership position of the case for several years	34 min recording	> 20 years
	E1.2	Research Consultant	Researcher in the field of the case	58 min recording	4 years
	E1.3	Project Manager	Client Onboarding and Project Manager of the case	43 min recording	3.5 years
	D1.4	Corporate presentation		49 pages	n/a
	D1.5	Conference talk		39 min recording	
	D1.6	Shipping company leadership discussion		50 min recording	
	D1.7	Webinar discussion		53 min recording	
MakerDAO	E2.1	Research Assistant	Researcher in the field of the case	38 min recording	3 years
	E2.2	Project Manager	Project Manager for the case	51 min recording	1 year
	E2.3	Senior Executive	Various leadership roles for the case	53 min recording	> 10 years
	E2.4	Research Consultant	Researcher in the field of the case	45 min recording	4 years
	E2.5	Consultant	Consultant in the field of the case	41 min recording	> 5 years
	D2.6	White paper		25 pages	n/a
	D2.7	Forum discussions		21 pages	
	D2.8	Workshop on governance and risk		90 min recording	
	D2.9	Annual recap call		26 min recording	
	D2.10	Technical documentation of FI		311 pages	

Data analysis

Our data analysis aimed to identify relevant aspects of the cases to answer our stated research question. These include details on how intermediation works in the specific contexts of the cases, which functions they fulfil, and how they are managed. For our data analysis, we followed the guidelines of Corbin and Strauss (1990). Here, we applied the three-stage process of open, axial, and selective coding to analyze our data. Across each phase, we utilized the computer software MAXQDA to assist us with routines.

In the open coding phase, one researcher from our team started to label all relevant passages in the data relating to intermediation with overarching concepts (Corbin & Strauss, 1990). To ensure reliability, a second researcher overviewed the labelled passages. Next, we conducted the axial coding by refining the codes and developing categories. We also identified relationships to sub-categories and tested their relationship to the data (Glaser & Strauss, 2017). Finally, we used selective coding to ascertain the relevancy of our categories and further explicate them for our case write-up (Eisenhardt, 1989). Multiple workshops with all involved researchers ensured the reliability and high rigor of the findings during all coding phases. Additionally, we followed the guidelines of Flick et al. (2004) to triangulate the findings from our cases with existing concepts of intermediation throughout the research process. This data analysis ultimately led to the four categories impacting intermediation, which present in our cross-case analysis. Figure 1 displays the process throughout all coding phases and their respective topic and outcome.

Finally, we present the findings from our research in the following section.

Findings

Case analysis

TradeLens

Overview: TradeLens was a blockchain-based application designed to improve transparency, efficiency, and collaboration in the global shipping industry. Before TradeLens, shipping documents and related information were often exchanged through paper-based channels or fragmented, siloed electronic systems, each maintained by different organizations or middlemen. Such fragmentation typically created delays, added costs, and introduced potential errors or opportunities for fraud. Thus, TradeLens aimed to connect stakeholders like shippers, ports, carriers, customs, and freight forwarders to digitizing processes that were previously manual and fragmented. This approach sought to reduce fraud, errors, and redundancies that occur in traditional paper-based systems and fragmented, siloed processes.

Existing intermediary: Before the introduction of the TradeLens blockchain solution, the supply chain industry

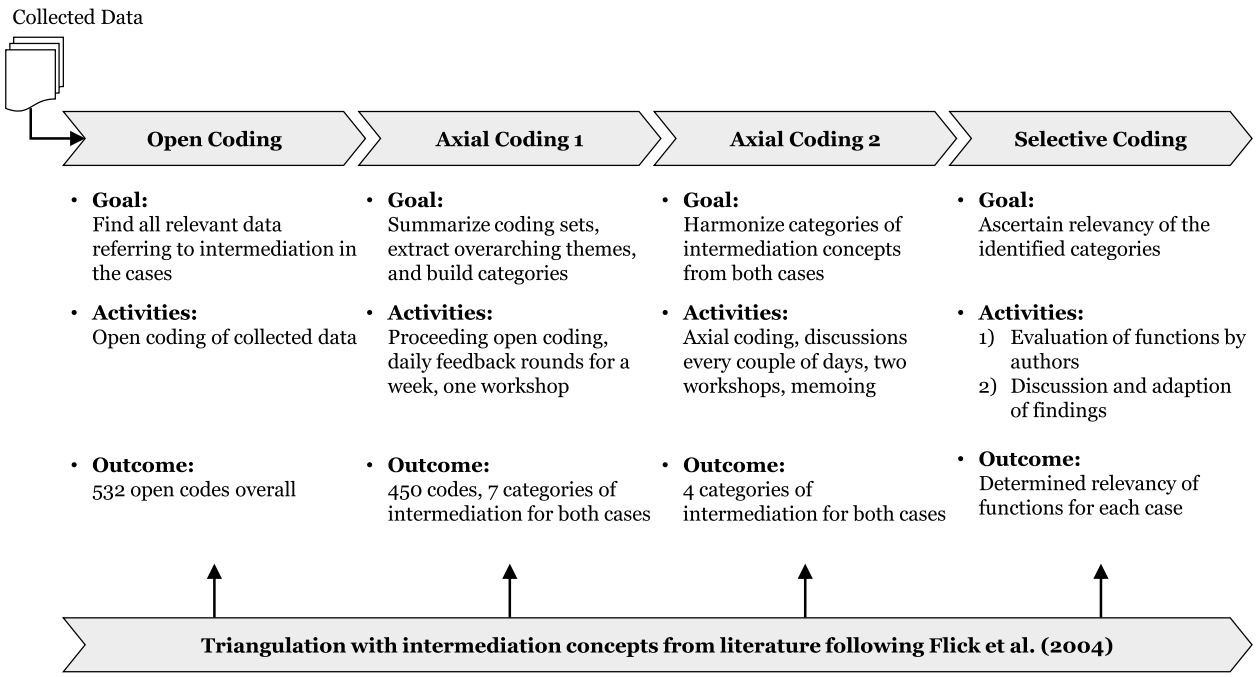

Fig. 1 Overview of collected data

heavily relied on various traditional intermediaries to facilitate international shipping and logistics. Key intermediaries included freight forwarders who coordinated shipments and managed the logistics; customs brokers who ensured compliance with import and export regulations; and shipping agents who handled the administrative aspects of maritime transportation. Additionally, financial institutions played a role in providing trade finance and managing payments, while insurers offered coverage for goods in transit. Regulatory bodies and government agencies were also essential intermediaries, overseeing trade regulations and security measures. These intermediaries were responsible for coordinating complex documentation processes, ensuring compliance, and maintaining the flow of information among numerous stakeholders, but their involvement often led to inefficiencies, delays, and increased costs due to manual processes and the lack of seamless information sharing.

Initial vision for disintermediation: The goal was thus to move away from reliance on costly third-party services that specialize in verifying documents or reconciling disparate data sources, thereby reducing both administrative overhead and opportunities for error or miscommunication. By consolidating all key shipping data onto a single, shared ledger, TradeLens hoped to eliminate some of the existing inefficiencies and risks. This aspect is highlighted by E1.3:

E1.3: "It is just, you know, picking up the phone and calling someone, either a trucker, terminal, or freight forwarder, and trying to find out where my cargo is. We believe by bringing together all these parties together in one platform, at least, they can share that data in one platform. And you can then visualize and conceptualize it. […] But it is also a matter of aggregating that data and sharing it in a way that it is easy to digest for the clients."

New intermediary post blockchain: The introduction of the TradeLens blockchain has transformed the landscape of intermediation within the supply chain industry. On the one hand, through TradeLens itself, a new intermediary emerged, responsible for optimizing the blockchain platform, ensuring onboarding of new partners, and providing governance as well as cybersecurity measures to protect sensitive data within the decentralized system. On the other hand, some traditional intermediation roles have diminished, but new forms of intermediation have emerged. Traditional intermediaries like freight forwarders, customs brokers, and shipping agents still played crucial roles, as their functions have evolved due to increased transparency and efficiency offered by TradeLens. This re-intermediation is evident as TradeLens itself assisted companies in integrating and managing the blockchain solution within their operations. Additionally, there is a growing need for regulatory intermediaries to navigate the complex legal landscape that arises from the intersection of international trade and digital technologies. Thus, while TradeLens has streamlined many processes, it has also created opportunities for new intermediaries to add value by enhancing blockchain adoption and ensuring its smooth operation.

Points of re-intermediation:

(1) **Governance**: Because TradeLens was permissioned and managed by IBM and Maersk, those two entities emerged as gatekeepers. They defined and enforced the governance rules of the application, determined how participants were onboarded, and maintained significant influence over protocols and software updates. Thus, although the project replaced certain traditional intermediaries associated with paperwork and manual reconciliation, it created a new form of dependency on a consortium authority. Because participation in TradeLens hinged on accepting the framework these two firms established, stakeholders effectively had to place trust in IBM and Maersk. This is also reflected by E1.1:E1.1: "Your container is moving from A to B, and all those instances it is seeing will be shown visibly on our platform. Uh, so you do not have to go through multiple routes to find that. So, the end goal is we want to bring together the supply chain industry in the ecosystem and say: 'Hey, we can work coherently together, and we can exist together in a way where we can also trust each other to share this information'."A related issue emerged from the consortium model itself. Unlike public blockchains, where anyone can join without special permission, TradeLens required participants to undergo strict onboarding and meet membership criteria set by the governing consortium. This arrangement effectively reinserted an intermediary-like role into the system: the consortium not only approved new entrants but also retained the power to remove or restrict members if they failed to follow certain rules or comply with regulatory requirements. In doing so, the platform introduced another layer of dependence on centralized decision-makers, replacing older layers of trust with a new, though arguably more transparent, administrative layer. This is reflected by E1.3:E1.3: "We are solely only looking out for the customer at the end of the day who is owning your cargo. They want to see a better service than you are currently giving right now. We can leverage that. Take you guy up and nudge and then you can be part of our [customer] board of directors and have a say in how you want to present this data on our platform. We do have some standards that we want you to meet, but anything above that is up to you to decide. […] We do have a customer board of directors, and then we have the executive board of directors. So, to say those ones who are actually sharing the data on

our platform have a bigger say than the ones that are actually other customers."

(2) **Data stewardship and custody**: The handling of data within TradeLens brought its own challenges. Although the project used a blockchain architecture, much of the critical information, particularly confidential or proprietary business data, was not placed entirely on-chain. Instead, documents that were sensitive in nature often remained partially off-chain or in a hybrid storage solution, in which pointers or hashes of the off-chain data are recorded on-chain. This approach was necessary to comply with national regulations on data privacy and to accommodate the many different legal jurisdictions involved in global shipping, as pointed out by E1.3:E1.3: "[…] there are, of course, some implications and some mitigations that we need to be aware of by taking this data from different sources. And also making sure that we do not share unnecessary information to competitors, and that is something that we have been working hard on to maybe leverage on that."However, this model required dedicated actors to host sensitive data securely, manage access permissions, and ensure compliance across jurisdictions. While the blockchain provided traceability and integrity for document references, it could not determine who should access a file, guarantee legal admissibility, or enforce data protection standards. As a result, participants had to rely on trusted external entities to safeguard and serve the original information, ensuring that data could be selectively shared, appropriately encrypted, and legally compliant. In that sense, the data steward performs a classic coordinating role: it reduces information asymmetry and regulatory risk for all network participants, making the ledger usable in practice.

(3) **Technical support and integration**: Technical integration also played a decisive role in reshaping intermediary relationships. Because TradeLens was designed to interface with legacy systems across diverse organizations, from shipping carriers and ports to customs authorities and freight forwarders, participants required not only technical connectivity, but also ongoing support in the form of standardized APIs, version control, onboarding assistance, and incident response. The lead technology integrator, owing to its technical expertise and ownership stake in the project, became the central intermediary for these services, as E1.3 explains:E1.3: "And maturity-wise, we are getting there for sure. We have roughly around 60% of the ocean freight market right now, and we, of course, want to get to 100 as close as possible […]. We definitely want to see more data coming into a platform. We are still trying to increase our network membership and expand our network member partnerships. We have a lot of terminal ocean carriers on the platform. […] We also want to focus more on custom authorities to come onto our platform. Bringing in a custom authority would give you even that extra notch."In effect, rather than eliminating the need for specialized support, TradeLens gave rise to a new coordinating role: a technical actor responsible for enabling interoperability and maintaining operability across the network's diverse participants. Unlike a generic vendor, this actor enabled transactional continuity by mediating technical interoperability between fragmented legacy systems. Participants with differing digital capabilities relied on the integrator to coordinate workflows, resolve incompatibilities, and ensure real-time operability of the platform. Without this layer, the distributed ledger would remain siloed and fragmented across organizations. In this sense, the integrator served as a technical and institutional intermediary, positioned between not only systems, but also between actors with diverging digital infrastructures and operational practices.

Taken together, these dynamics illustrate the multifaceted ways that TradeLens, despite aiming to streamline the shipping industry with distributed ledger technology, ended up creating new forms of intermediation. Whether it involved governance, membership control, data custody, or technical integration, the platform's reliance on a consortium of large corporate entities effectively replaced old intermediaries with new ones. This compromise was driven by practical considerations such as regulatory compliance, stakeholder trust, and the technical realities of integrating blockchain with complex, real-world supply chain processes.

MakerDAO

Overview: MakerDAO is a decentralized finance (DeFi) platform that leverages Ethereum's blockchain to enable users to create and manage DAI, a stablecoin whose value is pegged to the US dollar. Before MakerDAO, the process of generating a stablecoin on a permissionless network typically relied on either fully centralized issuers, like Tether or Circle, or involved collateralized lending systems that were still heavily reliant on traditional financial intermediaries. By allowing users to lock cryptocurrency assets in smart contracts as collateral, MakerDAO sought to provide a method for creating a stable digital currency without the need for traditional banks or centralized authorities. This was intended to reduce dependence on financial institutions and to grant broader access to financial services, such as lending and borrowing, within a trust-minimized environment, as E2.1 explains:

E2.1: "And this was also a bit the original vision to fulfil the mission of Bitcoin that one has a coin to carry out

everyday transactions without the fear that an investment which has been done today is worthless tomorrow. And that is exactly where MakerDAO is very welcome and provides this decentral autonomous organization to administer this."

Existing intermediary: Before the introduction of MakerDAO, the financial ecosystem heavily relied on traditional intermediaries such as banks, lending institutions, and credit agencies to facilitate lending and borrowing, manage risk, and provide financial stability. These intermediaries were responsible for tasks such as assessing creditworthiness, determining interest rates, managing collateral, and ensuring compliance with regulatory standards. The centralized nature of these institutions often led to inefficiencies, such as lengthy approval processes, lack of transparency, and barriers to access for individuals without established credit histories. Additionally, the reliance on these intermediaries introduced risks related to counterparty trust and the opacity of financial operations.

Initial vision for disintermediation: MakerDAO's foundational premise was to minimize the role of trusted third parties and offer a stablecoin (DAI) that would not be under the direct control of any single organization. Individuals with collateral (initially ETH) could deposit it into Maker Vaults, autonomous smart contracts, to mint DAI. The protocol's rules, including fee structures and collateral requirements, were governed by holders of the MKR token, who voted on proposals to update parameters. By relying on transparent, on-chain governance and algorithmic stability mechanisms, MakerDAO sought to eliminate the need for centralized entities that typically manage currency supply and set interest rates in traditional finance, as E2.3 elaborates:

E2.4: "And yes, with MakerDAO stablecoin, I do have the opportunity to relatively easy, and I do not want to circumvent the traditional finance system, send money around the world while being fast and cheap."

The protocol aimed to establish a fully decentralized stablecoin ecosystem, reducing both the administrative overhead of dealing with banks and the potential for corruption or mismanagement that can arise under central authorities.

New intermediary post blockchain: After the introduction of MakerDAO, the role of intermediaries has transformed significantly. MakerDAO initially eliminates the need for traditional financial intermediaries by allowing users to lock collateral in smart contracts and issue DAI stablecoins directly, creating a system with greater transparency and efficiency. However, this shift has led to a process of re-intermediation as new roles have emerged. Participants with expertise in blockchain development and smart contract security have become essential to ensure the resilience and reliability of the MakerDAO platform. Additionally, regulatory considerations have introduced the need for compliance experts to navigate the evolving legal frameworks surrounding MakerDAO. As such, while MakerDAO reduces reliance on traditional intermediaries, it simultaneously creates the need of new intermediaries focusing on technical proficiency and regulatory compliance.

Points of re-intermediation:

(1) **Governance and power concentration**: Although MakerDAO is nominally governed by decentralized consensus among MKR holders; the realities of protocol upgrades and risk management have created de facto power centers. This is reflected by E2.2:E2.2: "With your (governance) token and a vote, if you really wish MakerDAO to do well, then you have to do a lot of reading on these proposals because it is not that simple. You need to do your homework very well to understand what is being discussed."Certain large MKR holders, specialized risk teams, and recognized delegates emerged as core decision-makers in shaping collateral requirements, stability fees, and new governance processes. This structure means that while MakerDAO replaced traditional financial intermediaries, it introduced a new kind of "governance intermediary" in the form of influential token holders and specialized contributors. These individuals and groups carry substantial influence over the direction of the protocol and how new assets are added or managed, effectively reintroducing a layer of human decision-making that smaller participants must trust, as explained by E2.3:E2.3: "We use the governance token for "talking" and not just for pure speculation. There are now several suggestions. […] There is a lot of innovation going on here. And I'm sure will be able to pick the best from different initiatives […]. There is the need for somebody who backs this, and there needs to be an incentive where they don't just sit and look at others who don't participate."

(2) **Integration of centralized collateral and real-world assets**: MakerDAO began by using ETH as its primary collateral, with the aim of maintaining a purely on-chain ecosystem. Over time, however, the protocol started to accept centralized stablecoins like USDC to reinforce DAI's peg to the US dollar. Because USDC is issued by a regulated entity, Circle, this development introduced a new form of reliance on a third party capable of blacklisting or freezing funds. In addition, MakerDAO expanded into real-world assets, such as tokenized bonds, real estate, and other financial instruments. To tokenize these off-chain assets, MakerDAO had to rely on trusts, special-purpose vehicles, and custodial institutions that hold legal title in the real world. These custodians and legal intermediaries, while necessary to bridge the gap between on-chain and off-chain

value, reintroduced the type of centralized oversight and compliance obligations that the protocol initially sought to avoid.

(3) **KYC and regulatory compliance pressures**: As MakerDAO has moved deeper into real-world finance, the protocol and its ecosystem partners have come under growing pressure to meet regulatory requirements, including Know Your Customer (KYC) and Anti-Money Laundering (AML) standards. Certain real-world asset integrations may require users to disclose personal information or meet specific regulatory criteria before they can participate in the protocol. This shift effectively places a gatekeeper role on the entities managing these integrations, as they verify user identities and enforce compliance measures. While KYC procedures are intended to mitigate illicit activity and ensure legal compliance, they also reintroduce an intermediary function that MakerDAO originally sought to avoid. Users who wish to access certain vault types or interact with regulated assets must now navigate an additional layer of scrutiny controlled by off-chain intermediary, weakening the protocol's original vision of purely permissionless, trust-minimized finance as E2.4 explains:E2.4: "Whether MakerDAO is completely anonymous, if I carry out transactions there, that is another question. It is more pseudonymous, so with a smart AI, I could maybe still reveal who the person is. So even there, I do not have hundred percent privacy."

(4) **Reliance on external oracles and intermediaries**: Because MakerDAO depends on asset price feeds to determine the value of collateral (and thus assess whether vaults are sufficiently collateralized), it must integrate third-party oracles or rely on decentralized oracle networks such as Chainlink. This is explained by E2.1:E2.1: "And yes, what […] arises is first of all the stablecoin, which […] is tied to the U.S. dollar and thus quasi fulfills the function of achieving a certain value stability compared to traditional monetary values or index values. And in the case of MakerDAO, for example, this is […] because a possibility has been chosen there, so to speak, which is called over-collateralization." While these oracle networks aim to be robust and decentralized, MakerDAO still has to trust the accuracy, timeliness, and integrity of the data feeds. Any failure or manipulation in these oracle systems could significantly disrupt the protocol, effectively introducing another layer of intermediation. Additionally, as MakerDAO has grown more sophisticated, it has required specialized technical and legal expertise to navigate issues such as smart contract audits, regulatory compliance for real-world asset integration, and upgrades to the protocol. This expansion has led to new classes of intermediaries in the form of professional service providers, contractors, lawyers, and auditors, who collectively assume intermediary roles that were not part of the original vision of purely algorithmic finance.

(5) **Use of centralized exchanges**: Although MakerDAO is a set of on-chain smart contracts that does not formally require a broker to function, many users and investors acquire DAI or MKR through centralized crypto exchanges (CEXs). These exchanges are typically regulated entities that, in turn, introduce intermediary-like processes. They enforce KYC and AML checks, thereby acting as gatekeepers to the MakerDAO ecosystem. Users who store their DAI or MKR on an exchange surrender custody of those assets, subjecting themselves to the exchange's policies and any regulatory directives it must follow. Furthermore, centralized exchanges play a key role in liquidity and price discovery for DAI and MKR, and any operational or compliance-related actions by these exchanges, such as delisting or freezing withdrawals, can substantially affect the stability and market perception of MakerDAO. In this way, relying on centralized exchanges reintroduces a layer of third-party oversight and trust, partially undermining the protocol's original aim of granting users unfettered, direct control over their assets, as E2.5 points out:E2.5: "The interesting thing about the whole blockchain-based [financial systems] is, of course, that by cutting out the intermediaries, you have a bit of this trade-off: access is more direct and so it's more open […] But at the same time, of course, a big functionality of many intermediaries in financial markets […] is to create trust between these two ends of the transaction and also to provide the information that an investor needs to make informed decisions."

Taken together, these developments illustrate the tension between MakerDAO's original goal of establishing a fully decentralized stablecoin system and the complexities of interacting with real-world markets, collateral types, and regulatory frameworks. While MakerDAO successfully reduced or eliminated certain financial intermediaries (most notably banks), it created new forms of reliance on large MKR holders, regulatory-compliant custodians, and data feed providers. These power centers and service providers constitute a form of re-intermediation driven by practical considerations such as maintaining a stable peg, satisfying legal requirements, and ensuring the protocol's technical resilience.

Cross-case analysis

Although **TradeLens** in global shipping and **MakerDAO** in decentralized finance occupy opposite ends of the blockchain spectrum, one a permissioned, consortium-led network and the other a permissionless, community-governed protocol, both reveal that the promise of full disintermediation is bounded by three structurally recurring forces: **(i) system integrity and resilience**, **(ii) boundary and interface management**, and **(iii) governance efficiency**. Each force carves out zones of dependency in which specialist actors acquire influence, thereby reintroducing intermediary roles that the original designs had hoped to avoid.

System integrity and resilience require more than the cryptographic immutability supplied by a blockchain ledger. They also depend on uninterrupted operations, real-time risk controls, and, in financial settings, monetary stability. A blockchain can record an event immutably once it occurs, but it cannot by itself audit whether nodes stay online, restart crashed services, or patch a zero-day bug. In TradeLens, the heterogeneous software stacks of ports, carriers, and freight forwarders converged only because IBM occupied a fully fledged intermediary position. The company acted as a technical matchmaker and process facilitator, supplied standard APIs, maintained version control, and provided round-the-clock incident-response services, tasks that required discretionary judgement, rapid troubleshooting, and direct access to off-chain IT infrastructure, all of which lie outside the deterministic rule set of a blockchain. MakerDAO must solve the same resilience problem in a permissionless environment. A smart contract can enforce collateral ratios once prices are known, but it cannot pull those prices from external markets, evaluate the adequacy of real-world collateral, or certify that new code is free of hidden exploits. For that reason, MakerDAO relies on specialized risk units, external auditors, and oracle networks. Risk units aggregate information and certify protocol parameters; auditors review code and provide ex-ante assurances; oracle networks deliver authoritative price feeds that bridge the information gap between on-chain contracts and off-chain markets. In other words, oracles perform information brokerage, auditors and risk units handle risk underwriting and certification, and core units enforce governance by halting or upgrading contracts when pre-defined thresholds are reached, functions that programmable logic alone cannot satisfy because they require subjective evaluation, access to physical assets, or interaction with legal institutions.

Across both ecosystems, key performance metrics such as uptime, data integrity, and peg stability are achieved only because these human-run or institution-run agents carry out tasks the blockchain cannot: monitoring external conditions, validating real-world facts, and coordinating rapid responses to anomalies. Maintaining resilience therefore demands continuous oversight and coordinated intervention, which inevitably concentrates responsibility and influence in a limited set of highly specialized service providers. These providers become de facto stewards of systemic health, reintroducing intermediation into architectures that were originally designed to minimize it and demonstrating that the pursuit of resilience is itself a structural driver of re-intermediation**.**

Boundary and interface management becomes indispensable whenever a blockchain must interact with legal, physical, or informational realms that lie beyond its technological core. In TradeLens, bills of lading were hashed on chain, but the full documents were stored in an IBM-hosted enclave. Customs officers could decrypt those files selectively, and the enclave ensured compliance with national single-window regulations. A purely on-chain mechanism could not have performed this role, because a blockchain cannot determine whether a person is a legitimate customs agent, interpret evolving import laws, or guarantee that sensitive documents remain private while still being auditable by authorities. IBM and the customs agencies therefore acted as gatekeepers at the boundary, controlling access and certifying authenticity whenever cryptographic records of the blockchain solution touched real-world trade workflows. MakerDAO faces a similar challenge when it tokenizes assets such as U.S. Treasury bills or real-estate loans. Trustees hold legal title to these assets, licensed servicers track cash flows, and Circle, the regulated issuer of USDC, provides a liquidity backstop. MakerDAO also must satisfy know-your-customer requirements whenever real-world-asset vaults are opened, so specialized onboarding partners conduct KYC checks and whitelist addresses before collateral can flow on chain. Price-feed oracles translate off-chain market movements into on-chain reference data. A smart contract alone cannot verify a user's identity, confirm that an investor meets regulatory criteria, compel a borrower to repay a mortgage, or fetch live bond prices from global exchanges. Trustees, servicers, KYC providers, Circle, and oracle operators therefore step in as custodians and certifiers, managing access, enforcing legal rights, and validating information where the blockchain's cryptographic reach ends.

In both settings, the moment digital ledgers need to align with real-world facts, critical gatekeeping tasks gravitate towards specialized service providers. These actors authenticate documents, safeguard legal ownership, and guarantee data provenance, effectively reintroducing a layer of intermediation each time the ledger crosses its own boundary. Reconciling cryptographic records with regulatory mandates and physical assets thus proves to be a structural driver of re-intermediation, underscoring that even the most decentralized architectures depend on dedicated intermediaries to anchor blockchain data in the broader institutional landscape.

Governance efficiency that relies on expertise bundling confronts the human limits of collective decision-making. Once proposals become highly technical or time-sensitive, a fully open voting process no longer scales, because thousands of stakeholders cannot all read dense code audits, analyze market stress tests, or negotiate last-minute compromises. In TradeLens, rule-setting and software-upgrade decisions therefore flowed through a steering committee chaired by IBM and Maersk. This smaller forum could digest specialized information, reconcile conflicting interests, and prepare coherent proposals, lowering bargaining costs for the wider consortium even as it recentralized authority. A blockchain ledger on its own cannot schedule meetings, mediate disputes, or weigh nuanced trade-offs between performance and compliance; human decision-facilitators fill that gap. MakerDAO, though nominally egalitarian, reaches a similar solution. Large MKR holders, elected delegates, and dedicated core units review new collateral types, adjust risk parameters, and allocate operating budgets. Ordinary token holders delegate these intricate tasks because few have the time or expertise to examine complex financial models or security audits. The delegates and core units aggregate dispersed preferences, filter noise, and translate raw data into executable policy, while whales supply the voting weight needed to pass changes quickly when market conditions shift. Smart contracts can tally votes, but they cannot sift hundreds of forum posts, run scenario analyses, or craft balanced risk proposals; specialized human groups step in to perform those adjudicative and representational functions.

In both TradeLens and MakerDAO, the necessity of making high-stakes, informed decisions across distributed and diverse communities leads to the structural re-emergence of intermediary bodies (Table 3). These actors assume core governance functions: setting agendas, curating knowledge, resolving disagreements, and translating technical input into actionable policy. Their influence grows not despite the decentralized architecture, but because the architecture cannot by itself support efficient governance at scale. Thus, the search for governance efficiency, especially in the face of increasing technical and organizational complexity, is not just a workaround but a primary driver of re-intermediation. Even in systems designed to minimize hierarchy and central authority, intermediary structures resurface as essential components for maintaining strategic direction, legitimacy, and collective action.

Table 3 Overview of factors for re-intermediation in blockchain ecosystems

Factor	*TradeLens*	*MakerDAO*
System integrity and resilience	Network operator delivers interoperability standards, software releases and round-the-clock incident handling, ensuring consistent ledger availability	Data-safety layer of oracle providers, auditors and risk specialists maintains price accuracy, contract integrity and stablecoin solvency
Boundary and interface management	Document custodians and public authorities gate access to sensitive cargo data, enforce trade rules and certify authenticity at the perimeter	Asset and identity custodians such as trustees, KYC on-boarders, fiat-stablecoin issuers and oracles link legal ownership, user identity and market data to on-chain records
Governance efficiency	Steering committee of core participants curates agendas, arbitrates disputes and ratifies software upgrades for the consortium	Delegate layer of large token holders and specialized governance units filters proposals, sets risk parameters and executes protocol changes

Decentralization, centralization, and the dynamics of (re-)intermediation

Blockchain research often frames decentralization and the removal of intermediaries as two sides of the same coin (Rossi & Sørensen, 2022). In practice, however, these dimensions do not move in lockstep. Decentralization is a layered, dynamic

property that unfolds differently across technical, organizational, and governance layers (Ein-Dor & Segev, 1978; Hoffman et al., 2020; Schär, 2021; Walsham, 1993). A system may distribute block production widely yet still depend on a handful of actors for compliance, data curation, or emergency upgrades (Barbereau et al., 2023). Conversely, a permissioned network can decentralize certain decision rights over time even while its infrastructure remains centrally controlled.

Our empirical analysis highlights how this layered view reshapes the debate on dis- and re-intermediation (Zeiß et al., 2024). Functional demands, such as compliance, stability, and usability (Giaglis et al., 2002), create intermediation gaps that software code alone cannot fill. Where such gaps appear, intermediaries emerge to supply missing services, whether as technical integrators, data custodians, oracle providers, or governance delegates. The emergence of these roles constitutes re-intermediation (Giaglis et al., 2002), but the extent to which they are themselves centralized or decentralized depends on the system's starting architecture and regulatory context.

Based on our cross-case analysis, we indicate that permissioned systems such as TradeLens are initiated with a high degree of concentrated control over network access, data standards, and node operation. Over time, pressures for legitimacy and broader adoption may lead them to decentralize parts of intermediation; yet core infrastructural and data-custody tasks remain bundled in a central intermediary. Here, decentralization inches forward, but intermediary layers persist, often with clearer, more formal mandates than before. Permissionless protocols such as MakerDAO invert the sequence. They begin with open participation and algorithmic governance, but eventually assemble specialist layers, such as oracle networks, real-world-asset trustees, and compliance gatekeepers, to satisfy legal and operational requirements. The protocol remains technically decentralized, yet critical functions become recentralized in a comparatively small set of expert actors.

These contrasting pathways demonstrate that re-intermediation is not simply a regression to pre-blockchain structures. Instead, it is a reconfiguration of coordination roles that allows decentralized ledgers to operate within real-world institutional and technical constraints. Appreciating this nuance helps reconcile blockchain's decentralization ideal with the empirical reality that trusted actors continuously emerge, and sometimes concentrate power, around the edges of otherwise distributed systems.

Discussion

Theoretical contribution

The impact of blockchain technology on intermediation has been discussed by research and practice since the introduction of the initial Bitcoin blockchain. While most literature posits that disintermediation is inevitable (Chalmers et al., 2021; Perscheid et al. 2020; Tian et al. 2020), other researchers take a different perspective by proposing that disintermediation will not always be the outcome (Kollmann et al., 2020; Trabucchi et al., 2020; Weking et al., 2020). This study set out to examine the extent to which blockchain-based systems realize their promises of disintermediation in complex real-world settings, and how, despite these ambitions, new intermediaries (or re-intermediation) often emerge.

By comparing permissioned (TradeLens) and permissionless (MakerDAO) blockchain projects, the analysis shows that while each seeks to minimize or remove trusted third parties, both yield new gatekeepers or reconfigure existing ones. Even though MakerDAO aspires to "community-driven" governance, large MKR token holders or recognized delegates frequently hold disproportionate voting power. Meanwhile, TradeLens, governed by a consortium led by IBM and Maersk, confers privileged status on these corporations to define membership conditions and steer platform development.

In both cases, technical mechanisms that could distribute governance more evenly often yield to practical constraints, such as resource imbalances, specialized expertise, and regulatory pressures, that consolidate intermediation tasks among a few key actors. This phenomenon aligns with the iron law of oligarchy (Michels et al., 2017; Nakazawa & Fujihara, 2024), which posits that power tends to concentrate in the hands of a small group over time, even within organizations or systems intended to be democratic or decentralized. In the blockchain context, intermediaries may take the form of token whales, corporate consortia, or specialized risk and compliance teams whose authority emerges or deepens as the network grapples with technical governance, external regulation, and operational complexities. Consequently, the idea of a purely disintermediated system frequently collides with organizational and political realities, underscoring how blockchain ecosystems, despite their decentralized design, remain susceptible to oligarchic tendencies and governance capture. Thus, we also extend the body of literature on blockchain governance (Lacity et al., 2024; Lumineau et al., 2021).

These developments reinforce the debate between technological determinism and social shaping (Bijker & Pinch, 1987; Dafoe, 2015; Smith, 2001). While blockchain's technical design can automate certain trust functions, it does not alone dictate industry-wide outcomes. Stakeholders' power, institutional norms, entrenched business relationships, and user adoption patterns profoundly affect whether disintermediation is actually realized. Major players such as national customs authorities, shipping lines, or large institutional investors can push for design modifications that suit their

needs (e.g., permissioned membership, enforceable KYC protocols). Users often prefer the convenience of centralized exchanges or fiat-backed stablecoins, which reintroduce custodial relationships in an otherwise permissionless environment (Gramlich et al., 2023). Thus, the fate of disintermediation is not sealed by blockchain's technical features but is constantly renegotiated among regulators, technologists, firms, and end-users.

From a theoretical standpoint, the lessons of re-intermediation suggest a reframing: rather than viewing blockchains as radically eliminating intermediaries, it may be more accurate to see them as reconfiguring intermediation. Power and trust migrate to new nodes, such as consortium councils, major token holders, data custodians, compliance services, or bridging companies, thereby distributing risk and authority differently than in traditional models but not necessarily eliminating them. In practice, permissionless systems such as MakerDAO emphasize open participation but develop multiple "pockets of centralization" around collateral management and regulatory compliance, whereas permissioned systems like TradeLens reinforce closed membership and controlled data-sharing through powerful consortium leaders (Lacity et al., 2024). Each pathway points to hybrid organizational forms, in which certain intermediation functions become automated or decentralized while other functions remain in the hands of formal gatekeepers. Through our analysis, we provide a deeper understanding of re-intermediation through blockchain technology and propose two pathways of re-intermediation. Each archetype follows a trajectory which extends the current body of knowledge into re-intermediation through blockchain technology. Thus, our research serves as a starting point into a more nuanced discussion towards re-intermediation in the context of blockchain technologies.

Practical implications

Practitioners designing blockchain-based solutions can draw on these insights to plan for partial disintermediation rather than assuming a fully trustless paradigm. Identifying early which aspects of the system can be automated, which require human judgment, and which must be adjusted to accommodate regulatory or user-centric requirements can increase the likelihood of a successful long-term deployment. Meanwhile, researchers can delve deeper into how power is distributed in evolving blockchain ecosystems, tracking how governance tokens, consortium privileges, or bridging services shift over time. Longitudinal studies may uncover patterns of governance capture, adaptive re-intermediation, and user-driven pivot points that further illuminate why full decentralization remains elusive. Ultimately, the evidence suggests that re-intermediation is an essential, ongoing feature of blockchain deployment in regulated, real-world domains, and that understanding these patterns is critical to shaping balanced, innovative implementations.

Limitations

While we posit that our research serves as a promising starting point, we acknowledge several limitations to our findings. Even though we ensured inter-coder reliability and took steps to limit subjective influences, our findings might still be shaped by the perceptions of both our interviewees and our research team. We also conducted a limited number of interviews with people closely related to the project, which, although rich in data and sufficient for an in-depth understanding of our specific cases, may not fully exhaust potential insights. We recognize that this reliance on insider perspectives raises concerns about the validity and generalizability of our findings. However, our study follows a case-based and exploratory research design, and our intention is not to provide broad statistical generalization, but rather to develop theoretical insights into emerging intermediary roles in blockchain contexts. Future research should validate and extend our findings through additional interviews, including independent industry experts and stakeholders from comparable cases. Moreover, our focus on only two cases, each representing a distinct type of blockchain (permissioned and permissionless), may limit the transferability of our findings to other contexts where different governance models or stakeholder configurations prevail. Further, we acknowledge the importance of intermediation theory for our work. While our interpretive research approach provides only limited generalizability, we want to encourage future research to validate our findings with relevant concepts drawn from established theories. We believe that blending these concepts with our empirical observations will inspire more in-depth theorization of our findings.

Nonetheless, we provide a starting point from a more distinct academic discussion about the implications of blockchain technology for market intermediation. Here, our findings include several promising paths for future research. Future research should delve deeper into the longitudinal evolution of governance and intermediation in blockchain ecosystems, particularly in tracking how power concentrates or diffuses over time. Comparative studies across diverse industries can uncover patterns that shape blockchain's role in different socio-economic contexts. Additionally, exploring user-driven adaptations and innovative governance models will be critical to addressing challenges such as governance capture and maintaining equitable access within these systems.

Conclusion

Intermediation has been in the center of interest from academia and practice likewise for the past decades. With the introduction of emerging technologies like the internet or blockchain technology, researchers intensively discussed how intermediaries and intermediation functions are affected (Boreiko & Vidusso, 2019; Feulner et al., 2022; Zeiß et al., 2024). In this study, we highlight the multifaceted relationship between blockchain technology and intermediation in markets. Although blockchain has long been heralded for its potential to remove trusted third parties, our findings reveal a more complex reality. Rather than eliminating intermediaries, blockchain solutions often transform them, introducing new coordination roles to address governance, compliance, and technical requirements. This observation challenges the deterministic view that blockchain universally disrupts and decentralizes; instead, it underscores how blockchain's influence is shaped by broader organizational, regulatory, and technological contexts.

Drawing on two in-depth case studies, TradeLens, a permissioned blockchain within the shipping industry, and MakerDAO, a permissionless decentralized finance protocol, this paper illustrates divergent yet convergent trajectories of re-intermediation. In TradeLens, governance authority was consolidated under a consortium led by IBM and Maersk, effectively replacing traditional intermediaries with new gatekeepers responsible for membership, data stewardship, and rule enforcement. In contrast, MakerDAO's nominally decentralized structure nonetheless incorporates intermediaries such as large token holders, specialized oracles, and custodians for real-world assets. These findings demonstrate that the original vision of disintermediation is moderated by operational requirements, regulatory imperatives, and technical complexities specific to each domain.

The implications of these findings extend beyond the immediate context of blockchain. They invite a reevaluation of how emerging technologies interact with sociotechnical systems, emphasizing that decentralization and disintermediation are not universal outcomes but are contingent on broader structural factors. This reframing is particularly relevant in light of the growing regulatory scrutiny of blockchain ecosystems and the evolving expectations of users who often favor convenience and trust over purely decentralized models. By recognizing that blockchain technology reconfigures rather than removes intermediaries, organizations and policymakers can better anticipate and navigate the hybrid structures that emerge.

For practitioners and policymakers, the findings highlight the need for balanced approaches that integrate the efficiencies of blockchain with the realities of governance and compliance. Designing transparent and adaptable governance frameworks will be essential to mitigating risks of oligarchic tendencies and fostering trust in blockchain-enabled systems. Ultimately, this study calls for a more informed and pragmatic engagement with blockchain technology, recognizing its potential while addressing its complexities to ensure its sustainable and equitable integration into various market contexts.

Funding Open Access funding enabled and organized by Projekt DEAL. Bayerische Staatsministerium für Wirtschaft, Landesentwicklung und Energie, 20-3066-2-6-14, Nils Urbach

Data Availability The participants of this study did not give written consent for their data to be shared publicly, so due to the sensitive nature of the research supporting data is not available.

References

Abbatemarco, N., Rossi, L. M. de, Gaur, A., & Salviotti, G. (2020). Beyond a blockchain paradox: How intermediaries can leverage a disintermediation technology. In *Proceedings of the 53rd Hawaii International Conference on System Sciences*. Retrieved from https://scholarspace.manoa.hawaii.edu/handle/10125/64397

Ahluwalia, S., Mahto, R. V., & Guerrero, M. (2020). Blockchain technology and startup financing: A transaction cost economics perspective. *Technological Forecasting and Social Change, 151*, Article 119854. https://doi.org/10.1016/j.techfore.2019.119854

Alt, R. (2020). Electronic markets on blockchain markets. *Electronic Markets, 30*(2), 181–188. https://doi.org/10.1007/s12525-020-00428-1

Barbereau, T., Smethurst, R., Papageorgiou, O., Sedlmeir, J., & Fridgen, G. (2023). Decentralised finance's timocratic governance: The distribution and exercise of tokenised voting rights. *Technology in Society, 73*, Article 102251. https://doi.org/10.1016/j.techsoc.2023.102251

Beck, R., Müller-Bloch, C., & King, J. L. (2018). Governance in the blockchain economy: A framework and research agenda. *Journal of the Association for Information Systems, 19*(10), 1020–1034. https://doi.org/10.17705/1jais.00518

Bhargava, H. K., Choudhary, V., & Krishnan, R. (2000). Pricing and product design: Intermediary strategies in an electronic market. *International Journal of Electronic Commerce, 5*(1), 37–56. https://doi.org/10.1080/10864415.2000.11044193

Bijker, W., & Pinch, T. (1987). The social construction of facts and artifacts: Or how the sociology of science and the sociology of technology might benefit each other. In *Social Studies of Science* (pp. 17–50).

Boreiko, D., & Vidusso, G. (2019). New blockchain intermediaries: Do ICO rating websites do their job well? *The Journal of Alternative Investments, 21*(4), 67–79. https://doi.org/10.3905/jai.2019.21.4.067

Chalmers, D., Matthews, R., & Hyslop, A. (2021). Blockchain as an external enabler of new venture ideas: Digital entrepreneurs and the disintermediation of the global music industry. *Journal of Business Research, 125*, 577–591. https://doi.org/10.1016/j.jbusres.2019.09.002

Chanson, M., Bogner, A., Bilgeri, D., Fleisch, E., & Wortmann, F. (2019). Blockchain for the IoT: Privacy-preserving protection of sensor data. *Journal of the Association for Information Systems, 20*(9), 1272–1307. https://doi.org/10.17705/1jais.00567

Chircu, A. M., & Kauffman, R. J. (1999). Strategies for Internet middlemen in the intermediation/disintermediation/reintermediation cycle. *Electronic Markets, 9*(1–2), 109–117. https://doi.org/10.1080/101967899359337

Chong, A. Y. L., Lim, E. T. K., Hua, X., Zheng, S., & Tan, C.-W. (2019). Business on chain: A comparative case study of five blockchain-inspired business models. *Journal of the Association for Information Systems, 20*(9), 1308–1337. https://doi.org/10.17705/1jais.00568

Cisar, D., Schellinger, B., Stoetzer, J.-C., Urbach, N., Weiß, F. L., Gramlich, V., & Guggenberger, T. (2025). Designing the future of bond markets: Reducing transaction costs through tokenization. *Electronic Markets, 35*, 9. https://doi.org/10.1007/s12525-025-00753-3

Corbin, J. M., & Strauss, A. (1990). Grounded theory research: Procedures, canons, and evaluative criteria. *Qualitative Sociology, 13*(1), 3–21. https://doi.org/10.1007/BF00988593

Dafoe, A. (2015). On technological determinism: A typology, scope conditions, and a mechanism. *Science, Technology & Human Values, 40*(6), 1047–1076. https://doi.org/10.1177/0162243915579283

Datta, P., & Chatterjee, S. (2008). The economics and psychology of consumer trust in intermediaries in electronic markets: The EM-trust framework. *European Journal of Information Systems, 17*(1), 12–28. https://doi.org/10.1057/palgrave.ejis.3000729

Drnevich, P. L., & Croson, D. C. (2013). Information technology and business-level strategy: Toward an integrated theoretical perspective. *MIS Quarterly, 37*(2), 483–509. https://doi.org/10.25300/misq/2013/37.2.08

Dubé, L., & Paré, G. (2003). Rigor in information systems positivist case research: Current practices, trends, and recommendations. *MIS Quarterly, 27*(4), 597. https://doi.org/10.2307/30036550

Ein-Dor, P., & Segev, E. (1978). Centralization, decentralization and management information systems. *Information and Management, 1*(3), 169–172. https://doi.org/10.1016/0378-7206(78)90004-6

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy Of Management Review, 14*(4), 532–550. https://doi.org/10.5465/amr.1989.4308385

Feulner, S., Guggenberger, T., Stoetzer, J.-C., & Urbach, N. (2022). Shedding light on the blockchain disintermediation mystery: A review and future research agenda. In *Proceedings of the 30th European Conference on Information Systems*. Retrieved from https://aisel.aisnet.org/ecis2022_rp/13

Flick, U., Kardoff, E. von, & Steinke, I. (2004). *A companion to qualitative research*: Sage.

Fridgen, G., Radszuwill, S., Schweizer, A., & Urbach, N. (2021). Blockchain won't kill the banks: Why disintermediation doesn't work in international trade finance. *Communications of the Association for Information Systems*. https://doi.org/10.17705/1CAIS.04932

Gartner. (2021). *3 trends surface in the gartner emerging technologies hype cycle for 2021*. Retrieved from https://www.gartner.com/smarterwithgartner/3-themes-surface-in-the-2021-hype-cycle-for-emerging-technologies

Giaglis, G. M., Klein, S., & O'Keefe, R. M. (2002). The role of intermediaries in electronic marketplaces: Developing a contingency model. *Information Systems Journal, 12*(3), 231–246. https://doi.org/10.1046/j.1365-2575.2002.00123.x

Glaser, B. G., & Strauss, A. L. (2017). *The discovery of grounded theory: Strategies for qualitative research*. Routledge.

Gramlich, V., Guggenberger, T., Principato, M., Schellinger, B., & Urbach, N. (2023). A multivocal literature review of decentralized finance: Current knowledge and future research avenues. *Electronic Markets, 33*(1), Article 11. https://doi.org/10.1007/s12525-023-00637-4

Grover, V., & Teng, J. T. C. (2001). E-commerce and the information market. *Communications of the ACM, 44*(4), 79–86. https://doi.org/10.1145/367211.367272

Guggenberger, T., Lockl, J., Röglinger, M., Schlatt, V., Sedlmeir, J., Stoetzer, J.-C., & Völter, F. (2021a). Emerging digital technologies to combat future crises: Learnings from COVID-19 to be prepared for the future. *International Journal of Innovation and Technology Management, 18*(04), Article 2140002. https://doi.org/10.1142/S0219877021400022

Guggenberger, T., Stoetzer, J.-C., Theisinger, L., Amend, J., & Urbach, N. (2021b). You can't manage what you can't define: The success of blockchain projects beyond the iron triangle. In *Proccedings of the Forty-Second International Conference on Information Systems (ICIS)*.

Hoffman, M. R., Ibáñez, L.-D., & Simperl, E. (2020). Toward a formal scholarly understanding of blockchain-mediated decentralization: A systematic review and a framework. *Frontiers in Blockchain, 3*, Article 35. https://doi.org/10.3389/fbloc.2020.00035

Kollmann, T., Hensellek, S., de Cruppe, K., & Sirges, A. (2020). Toward a renaissance of cooperatives fostered by Blockchain on electronic marketplaces: A theory-driven case study approach. *Electronic Markets, 30*(2), 273–284. https://doi.org/10.1007/s12525-019-00369-4

Lacity, M., O'Leary, D. E., & Conway, D. (2024). Developing capabilities for B2B commerce on public decentralized networks. *MIS Quarterly Executive, 23*(4), 9.

Levina, N., & Ross, J. (2003). From the Vendor's Perspective: Exploring the Value Proposition in Information Technology Outsourcing. MIS Quarterly, 27(3), 331–364. https://doi.org/10.2307/30036537

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*, Article 111576. https://doi.org/10.1016/j.jss.2022.111576

Lumineau, F., Wang, W., & Schilke, O. (2021). Blockchain governance—A new way of organizing collaborations? *Organization Science, 32*(2), 500–521. https://doi.org/10.1287/orsc.2020.1379

Mahnke, V., Wareham, J., & Bjorn-Andersen, N. (2008). Offshore middlemen: Transnational intermediation in technology sourcing. *Journal Of Information Technology, 23*(1), 18–30. https://doi.org/10.1057/palgrave.jit.2000124

Michels, R., Lipset, S. M., & Berger, A. A. (2017). *Political parties*: Routledge.

Nakamoto, S. (2008). *Bitcoin: A peer-to-peer electronic cash system*. Retrieved from https://bitcoin.org/bitcoin.pdf

Nakazawa, R., & Fujihara, A. (2024). Proposal and Implementation of a Fact-Checking DAO. In *Proceedings of Blockchain Kaigi 2023 (BCK23). Journal of the Physical Society of Japan.*

Pereira, J., Tavalaei, M. M., & Ozalp, H. (2019). Blockchain-based platforms: Decentralized infrastructures and its boundary

conditions. *Technological Forecasting And Social Change, 146*, 94–102. https://doi.org/10.1016/j.techfore.2019.04.030

Purusottama, A., & Trilaksono, T. (2024). Intermediary business models: Using blockchain technology for intermediary businesses. *Business Process Management Journal*. https://doi.org/10.1108/BPMJ-03-2024-0141

Rensmann, B., & Klein, S. (2011). Sarkar, Butler & Steinfield (1995) "Intermediaries and cybermediaries" revisited: A review and identification of future research directions for intermediaries in electronic markets. In *BLED 2011 Proceedings* (27th ed.).

Rossi, E., & Sørensen, C. (2022). The meaning of de/centralization: A theoretical review, towards a conceptual framing. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4233664

Rossi, M., Mueller-Bloch, C., Thatcher, J. B., & Beck, R. (2019). Blockchain research in information systems: Current trends and an inclusive future research agenda. *Journal of the Association for Information Systems, 20*(9), 1388–1403. https://doi.org/10.17705/1jais.00571

Sarkar, M., Butler, B., & Steinfield, C. (1998). Cybermediaries in electronic marketspace: Toward theory building. *Journal of Business Research, 41*(3), 215–221. https://doi.org/10.1016/S0148-2963(97)00064-7

Schär, F. (2021). Decentralized finance: On blockchain- and smart contract-based financial markets. *Review, 103*(2). https://doi.org/10.20955/r.103.153-74

Schlecht, L., Schneider, S., & Buchwald, A. (2020). Creating value through blockchain technology: A Delphi study. In *Proceedings of the Twenty-Eigth European Conference on Information Systems*. Retrieved from https://aisel.aisnet.org/ecis2020_rp/164

Smith, M. R. (Ed.). (2001). *Does technology drive history?: The dilemma of technological determinism*. MIT Press.

Tan, T. M., Salo, J., Ahokangas, P., Seppänen, V., & Sandner, P. (2021). Revealing the disintermediation concept of blockchain technology. In R. C. Ho, A. H. H. Ng, & M. Nourallah (Eds.), *Premier reference source. Impact of globalization and advanced technologies on online business models* (pp. 88–102). Hershey, PA, USA: Business Science Reference.

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

Walsham, G. (1993). Decentralization of IS in developing countries: Power to the people? *Journal of Information Technology, 8*(2), 74–81. https://doi.org/10.1057/jit.1993.11

Weking, J., Mandalenakis, M., Hein, A., Hermes, S., Böhm, M., & Krcmar, H. (2020). The impact of blockchain technology on business models – A taxonomy and archetypal patterns. *Electronic Markets, 30*(2), 285–305. https://doi.org/10.1007/s12525-019-00386-3

Wigand, R. T. (2020). Whatever happened to disintermediation? *Electronic Markets, 30*(1), 39–47. https://doi.org/10.1007/s12525-019-00389-0

Yin, R. K. (2009). *Case study research: Design and methods* (4. ed.). *Applied social research methods series: Vol. 5*. Los Angeles: Sage.

Zeiß, C., Schaschek, M., Straub, L., Tomitza, C., & Winkelmann, A. (2024). Re-intermediation of the crypto asset ecosystem by banks: An empirical study on acceptance drivers among the populace. *Electronic Markets, 34*, 37. https://doi.org/10.1007/s12525-024-00720-4