Formative Archetypes in Enterprise Blockchain Governance: Exploring the Dynamics of Participant Dominance and Platform Openness

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Abstract

It is widely assumed that blockchain should, in principle, lead to decentralization. Yet, in practice, many enterprise blockchains are highly centralized. To explain this conundrum, we conduct a multi-case study of four enterprise blockchains: Walmart DL Freight, Contour, Chronicled MediLedger, and Cardossier. Exploring the dynamics of participant dominance and platform openness during their formative stages, we theorize that these blockchains correspond to the distinct archetypes of Chief, Clan, Custodian, and Consortium, respectively. Importantly, these archetypes shape the subsequent evolution of the governance approach, thus explaining why and how enterprise blockchains with dominant participants and limited openness later exhibit more centralized governance.

Keywords: enterprise blockchain, governance, inter-organizational systems, archetypes, formation

1. Introduction

In the wake of advancing information technologies, the significance of inter-organizational systems (IOS) has dramatically increased. These systems have emerged as crucial instruments for managing complex challenges that span across multiple organizations. However, their effectiveness is deeply intertwined with the ability to manage complex power dynamics and competing interests among participant entities (Boonstra & De Vries, 2005). Given the inherent diversity and contrasting logics of the participating organizations, these elements significantly influence the successful implementation and operation of such systems (Huang et al., 2003).

The increasing application of blockchain technology has introduced a new dimension to the IOS landscape. This development has been accompanied by a distinct set of challenges and opportunities, giving rise to the concept of enterprise blockchain systems (Seebacher & Schüritz, 2019; Ziolkowski et al., 2019). Despite the theoretical potential for decentralization inherent in blockchain technology, many enterprise blockchain applications exhibit a high degree of centralization (Beck et al., 2018). Indeed, despite the aspiration for a democratic management system founded on openness and equitable access rights, decentralized systems often exhibit a propensity for concentrated leadership and oligarchic governance (Bakos et al., 2021). This paradoxical dynamic is deeply rooted in the governance arrangements, the balancing act between participant dominance and platform openness, that are established during the formative phase of these systems.

This paper explores these complexities by asking: *How do participant dominance and platform openness impact centralization in the formative stage of enterprise blockchain governance?* To address this question, we conduct a qualitative multi-case study of four distinct enterprise blockchains: Walmart DL Freight, Contour, Chronicled MediLedger, and Cardossier. By analyzing these cases, we are able to explore the intricate interplay between participant dominance, platform openness, and centralization, during their formative stages.

Our research offers several key contributions. First, we introduce a model identifying four distinct governance *archetypes*, defined as ideal types of organizations reflecting intrinsic power structures (Mintzberg, 1984), each representing a unique blend of centralized and decentralized control. This model allows us to highlight the theoretical underpinnings of enterprise blockchain governance, offering insights into the intrinsic power structures at play. Second, we provide empirical insights into how these archetypes are embodied in industry cases, offering a detailed analysis of governance evolution. Finally, we elucidate the complex relationship between participant dominance, platform openness, and centralization. Overall, we offer a theoretical and empirical foundation for unpacking and shaping enterprise blockchain governance in research and practice.

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2. Theoretical Framework

Our theoretical framework (Figure 1) captures the dynamics of participant dominance and platform openness, drawing upon a logic of opposition to deterministic perspectives. This approach is apt for probing the dynamic interplay between technology and organizations (Robey & Boudreau, 1999). We identify four archetypes of enterprise blockchain systems with differing levels of centralized or decentralized governance. Influenced by the works of Mintzberg (1984), Boonstra and De Vries (2005), and Goldsby and Hanisch (2022), the model provides a solid foundation for our exploration of IOS archetypes in the formative stage of enterprise blockchain governance. We present this framework upfront, in line with typical paper structures, although it emerged through abductive reasoning, cycling between literature, theory, and evidence. Thus, we began our exploration of the formative stages in enterprise blockchain governance with an open mind, permitting the phenomenon itself to steer the development of our framework, rather than imposing prior framings on data (Monteiro et al., 2022).

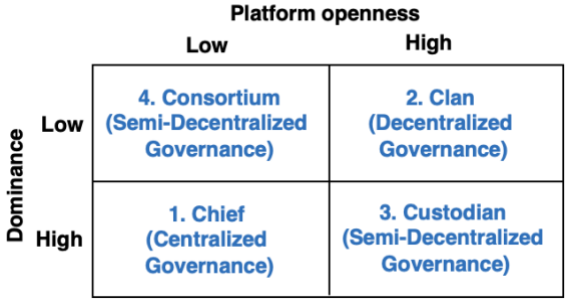

Figure 1. Formative Archetypes of Enterprise Blockchain Governance

2.1. Enterprise Blockchain Governance

The concept of governance, as traced by Mayntz (1998), has transitioned from a post-WWII hierarchical control paradigm to a cooperative model fostering collaboration and coordination. The advent of blockchain technology, as originally envisioned in Bitcoin, heralded a new era of decentralized, trustworthy, and distributed information systems, bringing forth a fresh approach to governance that could effectively circumvent challenges posed by traditional centralized governance (Beck et al., 2017; Shermin, 2017). In the absence of intermediaries, the collaboration between anonymous nodes is enabled by a consensus algorithm (Hacker et al., 2023). Companies are increasingly interested in adopting blockchain technology to enhance their business processes and gain a competitive edge (Cole et al., 2019; Koens et al., 2021). Moreover, blockchain-enabled systems are seen as instrumental in driving the trend towards decentralization that many organizations purportedly embrace (De Filippi, 2017).

However, the algorithmic governance of blockchain, characterized by an open, decentralized, and anonymous network without any human authority (Lustig & Nardi, 2015), presents a significant departure from traditional business practices, where organizations and individuals need to be identifiable and accountable in the event of legal actions. In response, enterprises typically modify the idealized form of blockchain governance to include trusted participants, ensuring data confidentiality and restoring control over the decision-making process (Wust & Gervais, 2018). Crucially, a shared governance framework for managing participants' rights and obligations emerges as a pivotal element in these enterprise blockchain systems (Lacity 2018). Unlike on-chain governance, business governance is not encoded on the blockchain but documented in business agreements and is therefore referred to as off-chain governance (Reijers et al., 2021) or human governance (Lacity et al., 2019).

Yet, even in a decentralized system, governance may lean towards centralization due to factors such as the presence of dominant stakeholders (Zachariadis et al., 2019). In fact, the decision-making process of blockchain systems, which is anticipated to be decentralized, frequently exhibits tendencies towards centralization instead (Beck et al., 2018). Hence, in this research, we delve into the factors contributing to the centralization of governance in enterprise blockchain systems. In line with Sunyaev et al. (2021), we consider governance to be decentralized when there is no central authority, and each member of the business community makes decisions autonomously and independently from other members within an enterprise blockchain system.

Blockchain-based systems can be categorized as IOS (Seebacher & Schüritz, 2019), emphasizing the importance of collaboration among organizations for their successful implementation (Beck & Müller-Bloch, 2017; Lacity & Van Hoek, 2021a). In enterprise blockchain systems, participating organizations share the responsibility for defining the system's governance (Lacity & Khan, 2019). Based on IT governance principles (Weil, 2004), this governance encompasses a set of rules that establish a decision-making framework, including decision rights, accountabilities, and incentives (Beck et al., 2018). The initial formation stage is crucial in this regard, as the resulting governance arrangements shape the subsequent evolution of the blockchain-based IOS. Thus, we focus on the formation phase,

where participants form a consensus on governance and decision rights (Pfister et al. 2022).

2.2. Participant Dominance

IOS facilitate institutional transformation, addressing cross-organizational problems and managing participant relationships. This process frequently grapples with conflicting interests and power dynamics, striving for balance among stakeholders (Boonstra & De Vries, 2005; Ozawa, 1993). However, the diversity of participating organizations can foster opposition and complicate these dynamics, influencing the system's success (Huang et al., 2003; Teo et al., 2003). Boonstra and De Vries (2005) emphasized that interests and power dynamics evolve over time and are influenced by changes in adopted technologies, highlighting the need for a continuous re-evaluation of power balances.

Dominant participants often influence IOS considerably, leading to hierarchically organized governance (Webster, 1995). This dominance can persist even amidst collective decision-making processes, influencing governance structures in line with their interests (Ansell & Gash, 2008). For enterprise blockchains, consensus-based governance can be susceptible to this manipulation, reflecting a founder-led archetype of structure at inception (Rauchs et al., 2019). While governance is typically the outcome of collective decisions (Chhotray & Stoker, 2009), power imbalances among stakeholders can perpetuate dominance (Payne, 2007). In the context of enterprise blockchain, governance is established through consensus, but collaborative governance of this nature is vulnerable to manipulation by influential stakeholders (Ansell & Gash, 2008). Mintzberg's (1984) classic model of organization life cycles suggests that new organizations tend to have an autocratic archetype of structure during the stage of formation. This observation is supported by Rauchs et al. (2019), who found that the vast majority of enterprise blockchain projects initially adopted a centralized approach.

As such, we see participant dominance as a vital factor influencing the centralization of enterprise blockchain governance.

2.3. Platform Openness

Platform openness considers the restrictions imposed on users beyond the business community. More open platforms offer greater access to various stakeholders (Tiwana et al., 2010). Depending on the level of openness, governance models can range from open and flat to closed and hierarchical (Laffan, 2012). Governance reflects decisions the business community makes regarding platform openness (Staykova & Damsgaard, 2015). Opening a platform to users requires adapting the governance structure to optimize positive effects for the platform (Parker & Van Alstyne, 2018). Therefore, platform governance results from the dynamic interplay of factors (Tiwana et al., 2010), and the platform's openness is one of those factors. Drawing these insights, we argue that platform openness influences the impact of dominance by reducing the level of centralization in enterprise blockchain governance.

2.4. Formative Archetypes

Based on these considerations, our theoretical framework (Figure 1) devises four formative archetypes of enterprise blockchain governance, each characterized by a degree of centralization (Goldsby & Hanisch, 2022; Mintzberg, 1984).

Archetype 1 (Chief, Centralized) presents unbalanced relationships with dominant participants manipulating the closed platform in their own interest with little or no restrictions. Such enterprise blockchain systems exhibit centralized decision-making, as the Chief decides for others. This hierarchical structure might be suitable at the project's inception to expedite the platform's development or in the scenario of a closed system designed to address a specific business issue without the apparent need for platform openness to external parties.

Archetype 2 (Clan, Decentralized) has balanced participant relationships and an open platform. In this archetype, the business community forms a clan that makes decentralized decisions in a collaborative fashion, based on equal rights among participants. This decentralized mode of governance enables synergies between the resources of all participants, directed toward a common goal: solving a shared business problem. Clan members will likely be first users, creating a positive environment for the platform launch. However, delays or poor platform performance may negatively impact the clan, potentially reducing participant engagement.

Archetype 3 (Custodian, Semi-Decentralized) sees balanced relationships but also has a semi-dominant leader guiding the system, resulting in a "benevolent dictatorship" with an open platform. In this archetype, a benevolent leader agrees to manage the platform for the collective benefit of the business community. However, the custodian's authority is contingent upon the support of other participants. Consequently, the custodian must foster consensus among participants prior to enacting decisions. Although power is technically centralized, it is

functionally reliant on shared and semi-decentralized decision-making. If the custodian is found to be unreliable, the community may change the leader.

Archetype 4 (Consortium, Semi-Decentralized) features a business community with low dominance and a platform with low openness, reflecting a collaborative and closed system. At the outset, participants may agree to delegate decision-making authority to either an individual or a group to oversee the project. This form of governance expedites platform development, enabling swift responses to business problems. However, if the consortium leaders fail to effectively guide the project, it can result in project collapse and failure. Subsequently, in a later phase post-platform launch, power distribution may shift to encompass all participants, ushering in a decentralized and collaborative mode of governance.

3. Method

Given the theoretical framework of this research and the timeliness of the phenomenon, we chose a qualitative research approach (Creswell, 2013). The case study is a suitable qualitative method that enables investigation of a timely phenomenon by examining a real-world case to address a "how" research question (Yin, 2018). To achieve this, we analyzed four cases to assess how governance emerged during inception, and the impact of participant dominance and platform openness on this dynamic. Thereby, we evaluated the effectiveness and applicability of our model, while also expanding our approach to unpack the dynamics at play. Our multi-case study design allows for robust and generalizable theory building (Eisenhardt & Graebner, 2007; Kaarbo & Beasley, 1999)

The philosophical stance of our research is rooted in the engaged scholarship framework proposed by Van de Ven (2007) and the problematization approach developed by Chatterjee and Davison (2020). The research problem we address is situated in the real world, as the adoption of enterprise blockchain by organizations has been on the rise. Yet, there is limited understanding of the factors that contribute to the centralized nature of its governance, despite the expectation of a decentralized model. By addressing this real-world problem and engaging with the existing body of knowledge, our research holds significance and offers contributions to future academic research while providing support to practitioners in structuring enterprise blockchain governance.

We selected cases according to what was necessary for theory development (Eisenhardt & Graebner, 2007) to examine formative archetypes in enterprise blockchain governance. In line with Eisenhardt's (1989) recommendations for building theories from case study research, case selection was driven by theoretical categories (corresponding to the theoretical framework presented in Section 2), rather than intuitive classifications.

Cases	Interviews	Archives	Studies
4.1	3	15	1
4.2	3	20	1
4.3	4	11	-
4.4	-	-	4

Table 1. Data collected and analyzed.

By combining 10 interviews, 46 archival documents, and 6 peer-reviewed studies, we gathered rich qualitative data that provides insights into the enterprise blockchain projects and their governance dynamics (see Table 1). In each of the cases, we focused on the leading companies that initiated the project, as well as the vendors involved in developing blockchain-based specific business solutions. Additionally, we considered companies that joined the project later. Through this process, we could identify key players within the organization and other relevant organizations involved in the project. During the research, three to four key persons were interviewed from each entity, and for the last case we had a review with one of the project's initiators. This approach facilitated the collection of valuable insights and perspectives from the key stakeholders involved in the enterprise blockchain projects under examination.

We conducted semi-structured interviews and collected archival data, including academic research conducted on the companies under study. Within archived documents, we gathered and examined relevant information and presentations produced during the project's development phase. The objective of reviewing these materials was to gain insights into the project's origin and the current corporate description of the solution. Special attention was given to any elements related to community governance.

In our data analysis, we employed a concept-centric approach, building upon concepts developed in Section 2. We began by identifying the data that pertained to these concepts and proceeded to analyze relationships, patterns, and characteristics to delve deeper into the underlying dynamics. By adopting a concept-centric perspective, we were able to derive valuable insights into the underlying meaning and context within the data, revealing patterns that may have been overlooked in raw data.

4. Case Study Findings

To inform our theorizing, this section analyzes four cases of enterprise blockchain governance, each corresponding to a distinct formative archetype.

4.1. Walmart DL Freight (Chief)

The DL Freight platform, launched in 2020 by DLT Labs for Walmart Canada, has substantially reduced invoice dispute rates with the company's carriers. This challenge is prevalent among supply chain partners who rely on separate proprietary systems, resulting in a complex and expensive reconciliation process (Lacity & Van Hoek, 2021b). The system's performance has demonstrated ongoing improvement (Tabak, 2020), resulting in less than one percent of invoices requiring discussion after eight months, compared to an average dispute rate of 70% prior to the platform's adoption (Vitasek et al., 2022). Notably, the need for extensive reconciliation between Walmart and its carriers has significantly diminished, due to a streamlined process where transaction parties collaboratively create and validate invoices (Hyperledger Foundation, 2020). Walmart's CIO stated, "Walmart identified the business problem, explored the different options and accepted the solution proposed by DLT Labs".

Walmart set the business objective and entrusted the implementation of the IS infrastructure and execution of the business strategy to a technology company. The decision-making authority is centralized within Walmart. To ensure permissioned relationships between Walmart and each carrier, the blockchain operates as a private network. The governance framework determines the participation rights and data visibility within the DL Freight system. Leveraging the functionalities of Hyperledger Fabric blockchain (Hyperledger Foundation, 2020), the platform enables "a permissioned onboarding process and restricts data access to the contracting parties involved in each specific transaction," according to DLT Lab's CIO.

The relationship between Walmart and its carriers is governed by business contracts that are independent of the technological platform. "These contracts are enforced for each transaction through smart contracts developed on DL Freight," explained Walmart's CIO. This represents a business consensus dominated by Walmart in a traditional customer-supplier relationship. As Walmart's CIO explained, "The new solution became the new national standard for Walmart Canada transportation management. Then, we started the process of onboarding the other sixty-nine carriers. It took some time to onboard each entity." Consequently, all carriers were required to use the platform for transactions with Walmart.

The platform primarily serves as a facilitator for transactions that previously occurred through conventional means. Indeed, replacing a labor-intensive and time-consuming reconciliation process across numerous information systems, DL Freight implemented a blockchain network that automates the process through the utilization of smart contracts (Vitasek et al., 2022). During interviews, all participants acknowledged that Walmart held a dominant position in its relationships with carriers. As a result, the balance of power reflected in the off-chain governance of the platform largely mirrors the pre-existing power dynamics between Walmart and its carriers, shaping the balance of power structures within the enterprise blockchain. This highlights how the genesis of the project plays a significant role in shaping the subsequent governance model.

Since all participants require permission from Walmart, their roles and rights are primarily centered around executing smart contracts that adhere to Walmart's terms and conditions. As explained by DLT Labs EVP, "Off-chain governance is about business rules governed by business contracts, and those are not dependent on the network. It would have been the same whether the system was based on any other protocol." Consequently, the social consensus within the platform is built upon an agreement regarding the business conditions related to platform usage. This underscores the significant influence of the balance of power among network participants on the dynamics of governance.

In summary, although Walmart and each carrier collaboratively establish the business conditions for transactions, Walmart assumes ownership of the platform and exercises control over the carriers. Thus, the platform operates as a closed system with a dominant participant, aligning with the "Chief" archetype of centralized governance.

4.2. Contour (Clan)

Contour, a Singapore-based company, was established in 2019 as a result of a digitization trade finance project initiated by R3, a technology company, and several major commercial banks (Sunderman, 2020). The primary objective of Contour was to introduce a digitized, secure, and efficient process for letters of credit (LC) using the Corda blockchain. Contour seeks to create value for banks and corporations by providing a comprehensive solution.

The Contour application was developed on the Corda Enterprise blockchain, which facilitates private systems with restricted information access limited to the involved parties (R3, 2019). According to BBL executive, "The key benefits of Corda blockchain are transparency, immutability, and a robust privacy around transactions, which makes it perfect for the financial industry." Ultimately, the platform's performance has resulted in a reduction of over 90%

in processing time by managing the administrative procedure within the blockchain database, which facilitates the validation of documents by both corporations and banks, thereby expediting the overall process (R3, 2021). The regional treasurer for the Asia-Pacific region at Cargill explained, “Simply put, we took a highly manual, complex transaction and made it more secure and efficient.”

Indeed, the Contour platform enhanced the established but often cumbersome and error-prone LC process. Instead of introducing a new process, Contour focused on improving the existing process. The decision-making process in terms of governance is permissioned, with only shareholders participating: “The supporting banks not only invested in the company but also appointed the top management, who proposed a governance model based on collaboration and equal voting rights among shareholders,” said ING executive. This means that the process is centralized among a limited number of companies.

Still, each company retains its decision-making authority while working towards the common goal. Contour’s COO said, “Contour's governance structure promotes a balanced decision-making process, facilitated by the collaborative approach adopted by the Contour management.” Stressing how the different signed contracts between shareholders shaped the community social consensus, Contour’s COO explained, “The network consensus is really a legal consensus as there are legal contracts in place which creates confidence for companies to use the system.” The interface between off-chain governance and on-chain governance is systematic. CryptoBLK CEO said, “It is essentially the implementation of mutual consent decisions (off-chain) into the blockchain (on-chain). We use the technology and the programming of the smart contracts to implement off-chain decisions. We convert the rules into smart contracts, into code, and ensure it follows the requirements.”

Further, Contour is open to financial institutions and corporations. In addition to the standard onboarding procedures of a public digital platform, Contour ensures that participants adhere to relevant regulatory requirements. The active involvement of major banks in Contour, as both investors and contributors to the governance framework, significantly contributes to platform adoption by fostering trust, confidence, and overall effectiveness. The absence of a dominant player is recognized as an essential condition for the platform to attract a diverse range of potential customers.

Overall, the top management of Contour assumes the dual role of project moderator and driver. By fostering collaboration and maintaining balanced power dynamics among participants, a social consensus was reached. Community members made co-investments in the company while retaining their decision-making autonomy, resulting in a decentralized form of governance. The Contour platform is open to users beyond the business community's decentralised governance. This exemplifies the Clan archetype.

4.3. Chronicled MediLedger (Custodian)

Chronicled is a US-based technology company that specializes in blockchain. In early 2017, they developed MediLedger, an open platform for medicine tracking and product verification, in response to new regulations on medicine traceability introduced by the US Food & Drug Administration (FDA) (Mattke et al., 2019). The MediLedger pilot was developed in collaboration with a working group led by Chronicled, which gradually expanded to include several prominent companies. Chronicled Sales Operations explained, “The MediLedger consortium is made of leading pharmaceutical manufacturers, wholesale distributors, group purchasing organizations, solution providers and supply chain management experts.” Given the secretive and competitive nature of the business, aligning these players was challenging.

Throughout the process, none of the participating companies desired sole platform ownership. The prospect of assuming legal responsibility associated with ownership made them uneasy, and such ownership would have hindered the platform's adoption among direct competitors. As a result, a collaborative approach was preferred, where no single entity claimed ownership, fostering a more conducive environment for broader industry adoption. Chronicled, as the platform developer, accepted the responsibility of retaining ownership and serving as the network manager for MediLedger. Indeed, as Chronicled CEO recalled, “Back in November 2017, at Pfizer headquarters in New York City, all companies involved were in this meeting and we told them “You should own this.” And the answer that came back was “We can’t own this, because I, Pfizer, cannot be liable if the system cannot work and companies cannot ship their products”. Then, we decided to keep building the solution because we knew the industry needed it. It might evolve in the future, but for the time being, Chronicled owns MediLedger and is the custodian of the network. The companies pay us service fees to run the software.”

The relationship between Chronicled, acting as the supplier, and each participant, serving as customers, is governed by the Charter, which is “a binding contract between each Member of the MediLedger Network with the Network Manager” and

"Each Member must agree to and accept all of the terms of this Charter." (MediLedger, 2020, p. 2). The Charter aligns with the guiding principles outlined in the project report, particularly in its emphasis on network values and operating principles. As Chronicled CEO said, "The Charter is like "Terms & Conditions" of the platform, and when a company signs a software agreement, it is effectively signing up for the terms."

One of the key principles outlined in the Charter is that the MediLedger network operates as a collaborative and vendor-neutral platform, ensuring fair treatment for all members. Additionally, the network is designed as a permissioned network, meaning that participation requires authorization, and anonymous participation is not permitted. These principles help establish a transparent and accountable environment within the MediLedger network. As long as prospective members meet these conditions, they can join the network. Premier VP SC said, "The neutrality of the network operator creates a foundational element of trust that convinces organizations to join the network not only because this is their interest businesswise, but also because they know they will receive a fair treatment."

The Charter amendment process allows any platform members to submit a change request to the MediLedger Advisory Board, with representatives from participant companies. Chronicled Sales Operations explained, "After review and discussion, the Advisory Board proposes amendments and/or modifications to the Network Manager, Chronicled. The Network Manager has the final decision on Charter's modifications." Ultimately, Chronicled holds the final decision-making authority regarding Charter modifications. However, the platform ensures that no decisions are made without first reaching a consensus among the network participants, emphasizing the importance of inclusivity and collaboration. This collaborative and vendor-neutral approach underscores the platform's nature. As Premier VP SC explained, "The whole idea is to come together and build a network that is supposed to be a single source of truth. Having a dominant actor would be the very antithesis of what the paradigm is."

Overall, Chronicled owns and governs the MediLedger platform, with industry players serving as clients. Although Chronicled has the authority to solely govern the platform, they adopt a collaborative decision-making model and seek consensus from the community. They operate as a "benevolent dictator," ensuring stakeholder involvement in the decision-making process. This case aligns with the "Custodian" archetype, characterized by an open system and a balanced power dynamic among participants.

4.4. Cardossier (Consortium)

The Cardossier case served as the focal point for a research paper conducted using the Action Design Research approach. Data was collected from this specific paper, as well as from three subsequent research studies conducted on the same case.

Developed on Corda base, the Cardossier platform is a permissioned system whose members represent key roles, such as road traffic authority, an insurance company, and a car importer, in the car market ecosystem in Switzerland. Motivated by the incentive model, which is thought as one of the governance mechanisms, participants in this consortium have an interest in sharing accurate and exhaustive information, which in return sustains the long-term development of the platform (Zavolokina et al., 2018, 2019). The problem addressed by Zavolokina et al. (2018, p. 1) was to "solve problems and improve processes which involve interrelationships (in some cases not apparent) between different untrusted, heterogeneous organizations." Their research focused on exploring the potential of blockchain technology in fostering trust within such environments. Based on the findings of Beck et al. (2018), the study highlighted the importance of incentive mechanisms for participants as a central aspect of the proposed solution.

Early in the project, only one company from each business sector related to the car market was part of the consortium: an insurance company, a car-sharing company, a car importer, and a road traffic agency. In addition to the absence of competition, there was no dominant player within the business community. Instead, the consortium was driven by a technology provider and a university. The consortium operated under a permissioned and private model. Despite the aspiration for democratic governance supported by blockchain and due to the innovative nature and inherent risks, the consortium initially opted for a simplified and conventional hierarchical governance structure in the formative phase. This decision was driven by the need to ensure efficient operations and promote a dynamic ecosystem. Furthermore, to formalize and facilitate the relationships within the consortium, the participating organizations had agreed to establish a legal entity, i.e., an association. By centralizing governance, the project aimed to manage risks and resolve conflicts (Zavolokina et al., 2020).

The Cardossier case highlights the tendency of a consortium within a blockchain-based project to select a leader in the absence of a dominant organization. In this instance, a board of directors appointed a Chief Operating Officer (COO) who had the authority to mobilize consortium members and steer the project in

the right direction (Zavolokina et al., 2020). Furthermore, this evolution in the governance of the Cardossier consortium, driven by the consortium's changing needs, underlines the dynamic and flexible nature of blockchain consortia. This case exemplifies how a business consortium can initially establish one form of governance and then transition to a different model to generate value for participants (Bauer et al., 2020). Later, the Cardossier consortium shifted towards a more collaborative governance model with diverse organizations involved to encourage broader participation, exemplifying the Consortium archetype.

5. Discussion

Our investigation into the governance of enterprise blockchains uncovered four distinct archetypes: Chief, Clan, Custodian, and Consortium. Walmart Canada and DLT Labs' DL Freight platform exemplified the Chief archetype, illustrating a business relationship where a single dominant entity (Walmart) holds the decision-making authority and imposes its business rules on other participants. Conversely, the Clan archetype was manifested by Contour, a blockchain platform with no single dominant player, characterized by balanced power dynamics and a collaborative governance model. MediLedger, developed by Chronicled, demonstrated the Custodian archetype, where a single entity owns and governs the platform but operates under a collaborative decision-making model. Lastly, the Cardossier case portrayed the Consortium archetype, where initially centralized governance transitioned into a more open model to broaden participation.

5.1. Implications

Our research contributes to the academic discourse by introducing a novel theoretical framework of four distinct governance archetypes in the realm of enterprise blockchains. These archetypes provide a theoretical lens to elucidate the intrinsic power structures at play within these systems. Our case studies empirically substantiate these theoretical archetypes in action, revealing insight into how governance structures evolve and adapt over time.

Through our nuanced exploration of these cases, we advance understanding of the complexities and potential pitfalls surrounding the interplay between participant dominance, platform openness, and centralization in enterprise blockchain governance. While the dynamic relationship suggests that participant dominance can either foster or stifle platform openness, it equally poses risks. Dominant actors, while they can potentially utilize platform openness for the commendable aim of promoting decentralization, may also exploit it to consolidate their power, thereby marginalizing other participants and reducing the overall inclusivity of the blockchain ecosystem. This can lead to skewed power dynamics and reduce trust among stakeholders.

Similarly, while platform openness may, in theory, act as a counterbalance to undue dominance, its overemphasis might expose the system to external threats, dilute the focus, and make consensus harder to achieve. Moreover, without adequate governance, a highly open platform can become a breeding ground for conflicts of interest and opportunism. Thus, while strategic calibration between participant dominance and platform openness seems desirable, it is fraught with challenges. Achieving the 'right balance' necessitates vigilant oversight, robust governance mechanisms, and continuous recalibration to avoid the potential pitfalls of both unchecked dominance and unchecked openness in enterprise blockchains.

Our findings hold valuable practical implications for industry practitioners involved in the deployment of blockchain technologies. Depending on their position within the enterprise blockchain ecosystem, organizations can select a governance model that aligns with their business objectives, power structures, and desired level of openness. Dominant organizations can adopt the Chief model to exercise centralized control, whereas organizations seeking a more collaborative and egalitarian model might find the Clan or Consortium models more suitable. Even entities taking ownership, as in the Custodian model, can benefit from our findings by understanding the need for fostering transparency and collaboration.

5.2. Limitations and Future Research

We acknowledge that our study has limitations. Firstly, the selection of cases is not exhaustive and the development of these blockchain systems is an ongoing process, which might lead to changes in their governance structures. Secondly, the dynamics and evolution of blockchain governance are complex and influenced by numerous factors that are difficult to capture fully in a single study. Future research could focus on how these governance archetypes evolve over time and the factors that drive such transformations.

6. Conclusion

Our study elucidates the diverse ways in which governance is enacted at the formative stage of enterprise blockchain systems. Our exploration of the Chief, Clan, Custodian, and Consortium archetypes reveals the multifaceted nature of enterprise

blockchain governance, each archetype reflecting a unique interplay of participant dominance, platform openness, and centralization. By doing so, our research expands the understanding of enterprise blockchain governance and provides a roadmap for organizations navigating this challenging terrain. We hope this study not only informs current practices but also stimulates further discourse, refining our understanding of blockchain governance in the evolving landscape of digital technology.

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