Governance of Blockchain-Based Platforms

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Abstract. Blockchain technology may disrupt industries by disintermediation. Hence, it challenges market-oriented platforms like Amazon or Facebook as intermediaries. In the case of blockchain-based platforms, if there may be no platform owner as an intermediary, the different sides of a platform will still need to be orchestrated by platform governance. Following this, blockchain-based platforms must also have mechanisms for orchestrating their platform sides. These mechanisms of blockchain-based platforms may differ from traditional platform governance. This research aims to enhance the understanding of governance mechanisms of blockchain-based platforms. For this purpose, a case study is conducted to analyze the governance mechanisms and their manifestations. Therefore, the initial governance mechanisms were taken from research on platforms. As a result, blockchain specific characteristics of governance mechanisms were identified.

Keywords: platform governance, blockchain, distributed ledger technology

1 Introduction

In recent years innovative business models emerged based on various platforms [1]. Firms providing platforms often dominate their target markets, like Alphabet (Google) the internet search market or Amazon the market for online book shopping [2]. Furthermore, emerging online platforms challenge traditional industries, like Airbnb the lodging, Uber the cab market and Netflix the entertainment industry [3]. At the same time, most of the valuable firms offer platforms (e.g., Alphabet or Apple) and exceed the value of industrial firms like ExxonMobil or Boeing [4]. These firms operate multi-sided platforms and offer their products or services to several sides, e.g., buyers and sellers or advertisers and consumers [5]. Therefore, they have to manage the coordination of these platform sides [6]. Research in information systems (IS) has been investigating the reasons for the success of these platforms from various perspectives for several years [7]. Thereby, the area of platform governance became a focus of attention for orchestration of the different user sides of platforms and to manage their behavior on these platforms [8–10].

From a technological point of view the blockchain technology might be one of the greatest innovations in recent years [11]. Its first implementation was the cryptocurrency Bitcoin. Afterwards, Ethereum was introduced, which offers a wider scope of applications including a scripting language. Following this, manifold types

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of applications and use cases have arisen, which were not limited to the financial industry (e.g., [12–15]). By this widespread application there is a potential of disruption by blockchain, which can be seen in various ways (e.g., [13, 14, 16–19]). Hence, blockchain provides the possibility for decentralization and disintermediation by trust in the system instead of trust in counterparties or intermediaries [11].

Considering traditional platforms as trusted intermediaries between the sides of a platform [8] and blockchain technology as a possibility for disintermediation [20] the question arises how blockchain-based platforms are governed and whether there are differences to the governance of traditional platforms. Consequently, the theory on platforms governance needs to be extended to take the specific features emerging by blockchain technology into account. Especially the governance of platforms might shift to decentralized forms [21, 22]. This leads to the following research question:

"How are governance mechanisms implemented in blockchain-based platforms?"

The remainder of this article is structured as follows: First, we give a theoretical background about platform governance and blockchain technology and introduce the used research methodology. Afterwards, we present the results of the analysis and discuss them. Finally, the article finishes with a conclusion including suggestions for further research.

2 Theoretical Background

2.1 Platform Governance

In literature manifold definitions of platforms and ecosystems can be found. For example Reuver et al. [23] distinguished in their review between digital and non-digital platforms, whereby the main component of a digital platform is an extensible codebase and the possibility to add third party modules. In contrast, Thomas et al. [24] identifed in their review four research streams: organizational, product family, market intermediary and platform ecosystems. They also identifed the market intermediary stream as the fastest growing one. Additionally, Schreieck et al. [7] found more than 20 different definitions of platforms. They differentiate between technology-oriented and market-oriented perspectives on platforms, which are not mutually exclusive. The technology-oriented perspective is defined as "a set of stable components that supports variety and evolvability in a system by constraining the linkages among the other components" [25] and investigates hard- and software platforms. In contrast, the market-oriented perspective is defined as "Markets, where users' interactions with each other are subject to network effects and are facilitated by a common platform provided by one or more intermediaries" [26] and it focuses on marketplaces and communities.

Platform governance refers to the mechanisms used to control the platform. The current state of research was investigated by Schreieck et al. [7] and Hein et al. [27] in literature reviews, whereby the review of Hein et al. identified 15 governance mechanisms, which were assigned to 6 dimensions, shown in Table 1. In the following, these governance mechanisms are described.

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Table 1. Platform Governance Mechanisms

Dimension	*Mechanisms*
Governance structure	Governance structure
	Decision rights
	Ownership status
Resources & documentation	Platform transparency
	Platform boundary resources
Accessibility & control	Output control & monitoring
	Pnput control, securing
	Platform accessibility
	Platform control
	Platform openness
Trust & perceived risk	Strengthen trust
	Reduce perceived risk
Pricing	Pricing
External relationship	External relationship management

The *structure of platform governance* can be centralized or decentralized, whereby it is diffused among the different stakeholders of the platform [28]. The next governance mechanism is decision rights and their division between the platform owner and complementors. In particular, this means who has the authority and duty to make decisions in the platform [9]. Moreover, the ownership structure of a platform can be single or shared ownership [5]. If one side owns the platform this has an impact on network effects, which do not arise symmetrically [29].

In the dimension *resources & documentation* the platform transparency has been identified as a key element between the platform and its complementors. The intention to contribute to the platform is determined by the perceived transparency and accessibility of a platform. Moreover, attracting experts on a platform may increase its success and innovation. Furthermore, the perceived openness of a platform can be leveraged [30]. The mechanism boundary resources relates to capabilities offered by the platform owner (e.g., APIs, SDKs or other tools). The platform can enhance its complementors or users by making these resources available [31].

The dimension *accessibility* describes the mechanisms related to the openness of a platform. Its participants perceive a platform as open in terms of transparency and accessibility [30]. Moreover, opening a platform can increase the market size in most cases and can be considered at several levels [5, 32]. In addition, openness of a platform can be reached by giving competitors access to the platform or by giving up control over the platform [33].

The dimension *control* relates to formal and informal control mechanisms. First, formal control mechanisms are output and process control. In order to control the output, the platform owner specifies criteria to evaluate the complementors output and afterwards to reward or penalize them [9]. Moreover, it can enhance the platform's scope and is often combined with increased control of the output, called securing [31].

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The process control describes procedures, methods and rules, which should be used for the desired output [8, 34]. In contrast to other control mechanisms the informal ones are usually not documented [9, 34].

Next, *trust & perceived risk* contains the mechanism for enhancing the user's trust in the platform and reducing their perceived risk [28, 35].

Another mechanism is *pricing* in form of transaction or access fees. It describes who is able set the price and what prices are set for the sides of the platform [8]. By unequal pricing for different sides it is possible to leverage network effects. For example, network effects can enhance in a two-sided platform network by setting a lower price for one side. For the other side a higher price can be charged for generating revenues [29]. Moreover, the pricing is influenced by the decision of permitting the use of complementary platforms [36].

The last mechanism *external relationship* describes the management of external relations as a capability. For example, it can be used to strengthen the platform's boundaries [37] or to utilize external resources and capabilities [38].

2.2 Blockchain Technology

The concept of blockchain is a kind of distributed ledger technology. It is a distributed storage of transaction data, which is synchronized among various participants in the network, called nodes. Changing data is difficult, because of consensus mechanisms, which are used for validation and depend on the design of the blockchain [39]. The main features of blockchain technologies are decentralization, data integrity and security, transparency, auditability and automation [40]. Additionally, some blockchains support smart contracts. These event driven programs are stored in a blockchain and are executed on it [41]. In the following a brief description of consensus mechanisms and a conceptual classification of blockchain designs is given. Afterwards, related research on blockchain technology is described.

The most common used consensus mechanisms are Proof-of-Work (PoW), Proof-of-Stake (PoS) and Practical Byzantine Fault Tolerance (PBFT). In PoW computing power is used to calculate a hash value of a block of transactions whereby the target is specified. This mechanism uses a lot of computer power and has therefore the highest energy consumption. As opposed to this, PoS uses the account balance of participants to select which one verifies the next block. This mechanism uses less energy than PoW. Lastly, PBFT is a mechanism that tolerates byzantine faults. For that, it uses three consecutive voting rounds with participation of 2/3 of the network. Other consensus mechanisms may be Delegated-PoS among others [42].

A common classification of blockchain technology uses its openness. In a public blockchain, anyone can read and submit transactions while a private blockchain is restricted to defined participants. Additionally, the verification can be categorized to permissionless blockchains, where anyone can validate transactions or permissioned blockchains in which the ability to validate transactions is restricted [40, 43]. The classification of openness leads to three types of blockchains: private, public and federated. A private blockchain is typically private and permissioned whereas for a public blockchain the opposite is true, namely public and permissionless. In between

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both extremes, there are federated blockchains, also named hybrid or consortium blockchains. These do not follow the strict partition of public or private and can have different settings [42, 44].

The research on blockchain technology and its amount in various research fields is increasing. In the field of research on IS the largest part is devoted to design research and conceptual research [45]. The question whether the blockchain technology is disruptive or not is examined from different perspectives. Research shows the disruptive potential of blockchain in finance [18] and that is not limited to this area [19]. Moreover, its disruptive potential in general was analyzed and it was shown that it is rather an evolution of existing business models than a disruption [46]. Other research focuses on the adoption of blockchain technologies in enterprises [47]. Furthermore, the human acceptance of blockchain was examined by the example of cryptocurrencies [48]. Additionally, there are a few classification frameworks for blockchain. One study delivers an ontology based on different layers for the components of a blockchain system [49] and another one creates a taxonomy of distributed consensus systems [50]. Also an evaluation framework for the value of distributed consensus systems was designed [51].

Furthermore, governance mechanisms of blockchain were examined using the example of land registries. The theoretical background of this work are governance archetypes of free and open source software development. The result is a blockchain specific type of governance called tribal governance [22]. Based on this, the governance of blockchain projects in various domains was analyzed using an explorative approach [52]. In addition, governance of blockchain-based organizations was examined by the example of cryptocurrencies using corporate governance mechanisms from organizational research. For this, internal governance at the blockchain level, at the protocol level and at the organizational level and external governance at the community level, at the social and at the media level was used [53]. Moreover, Beck et al. [21] investigate governance mechanisms of blockchain-based platforms by a common data governance framework using the dimensions decision rights, accountability, and incentives.

3 Methodology

We apply a multiple case analysis according to Yin [54] to answer the research question on the governance mechanisms on blockchain-based platforms. This is appropriate, because we want to identify characteristics of governance mechanisms applied by blockchain-based platforms. Additionally, a multiple case study can enhance the strength and the robustness of the results [55]. Because of this, we searched via web-search for blockchain-based platforms with underlying business models of common market-based platforms, like social networks or marketplaces, which had to match the following inclusion criteria. First, it has to be a market-oriented platform matching the definition given above. Second, the platform has to use blockchain technology as a key feature. Third, it has to offer a service to customers and should not only exist in the state of a concept. Moreover, it has to

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provide its services in English language. Thereby, we select three platforms with different underlying business models and also using different blockchain technologies. Finally, we add a fourth platform to the list, which is using a similar underlying business model and the same underlying blockchain technology like an already included one. The selected platforms are described in the beginning of the following chapter.

For the case study, we reviewed public available documentations of the selected platforms. These data include websites, developer guidelines, press articles and blog posts. Furthermore, we tested the platforms themselves if possible. As a starting point for the analysis we have used the structure of Hein et al. [27], because it is the most comprehensive framework on platform governance including the market-oriented perspective according to the authors' knowledge. On this basis, the available data were analyzed according to the platform governance mechanisms taken from the literature. In this process, we identify blockchain specific characteristics of these mechanisms. Subsequently, we compared the characteristics of the respective mechanisms.

4 Multiple Case Study

4.1 Description of the Case Companies

For the multiple cases study we select a social network, a marketplace of virtual goods and two service platforms, which offer marketplaces for freelancers and their employers. The selected platforms are listed in Table 2.

Table 2. Selected Case Platforms

Platform	*Business model*	*Underlying blockchain*	*Openess of the blockchain*	*Consensus mechanism*
Steemit	Social network	Steem	public/permissionless	dPoS
Dmarket	Marketplace	Exonum	private/permissioned	PBFT
Blocklancer	Service platform	Ethereum	public/permissionless	PoW
Ethlance	Service platform	Ethereum	public/permissionless	PoW

As a social network we select *Steemit*. It is open source in back- and frontend and it uses its own blockchain called *Steem*, which is a public and permissionless blockchain using delegated PoS for consensus. For a marketplace we select *Dmarket*, on which virtual goods can be traded directly or via auctions. It offers good trading on the Steam Community Market, which it uses as a payment provider, or direct trading between the participants. For accounting, it uses the blockchain framework Exonum, which uses a kind of PBFT as consensus. As a service platform, we select *Blocklancer*, which matches freelancers and their potential employers by direct offers, a bidding schema, etc. It uses the public available blockchain Ethereum. Additionally, we select *Ethlance* offering the same services, without a platform provider.

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4.2 Results of the Analysis

This section describes the results of the different cases. Therefore, we refer the identified characteristics of governance mechanisms to the dimensions of platform governance given above. The Table 3 summarizes these findings using the structure of dimensions and mechanisms from Hein et al. [27].

Governance structure: This dimension shows centralized ownership along all analyzed platforms, except Ethlance. Although Steemit is open source in the frontend, so anyone can contribute to the code, there is still a platform operator. The same applies to Blocklancer. In contrast, Ethlance has no operator. However, there are differences in the decision rights and the governance structure. The shared decision rights at Dmarkt are the only ones based only on pricing. In contrast, Steemit and Blocklancer delegate some decision rights to their users. Therefore, Steemit uses a kind of delegated proof of stake, so the users can vote for the peers to which they want to delegate the creation of new blocks. Thus, the decision about the validity of the data is no longer with the platform owner or operator but with the users. In addition, Blocklancer shared their decision rights. They use a dispute mechanism called "Token Holder Tribunal", on which token holders can participate. This mechanism has the power to decide about the payment of the freelancers or refund the employer. Although Ethlance has the most decentralized approach giving up all decisions about the platform, the community of developers make decisions about the platform.

Resources & documentation: In the mechanism of documentation, nearly all analyzed platforms offer the same basic features, but they vary in the scope of their documentations. The same holds for boundary resources. For example, APIs are just offered by Steemit and Dmarket, which do not use the public Ethereum blockchain. Another form of boundary resources appears in form of tokens. Especially Steemit and Blocklancer use tokens for the participation on decision rights. These tokens can be earned by using the platform or be bought at an external exchange. The transactional data stored on the blockchain is often public, while master data in general is not stored on it. Only Ethlance has no own account management and uses an Ethereum wallet for this.

Accessibility & control: This mechanism shows a few varieties between the platforms. First, most of them have no access restrictions except from a registration and the use of an account. In addition, some have waiting times to enter the platforms or use features of it. Steemit requires in addition a telephone number for the registration, which should prevent fake accounts. Blocklancer acts similar and requires a buy-in to participate in its dispute mechanism, which should prevent frauds. Blocklancer may also request additional information in case of withdrawals. For adding a profile or something similar on Ethlance an amount of Ether is necessary to pay the transaction fees on the Ethererum blockchain.

All platforms considered are transparent and offer free access to their transactional data and provided processes. Nevertheless, the degree of transparency depends on the used type of blockchain. Using a public blockchain, like Steemit, Blocklancer or Ethlance, allows anyone to view the transactional raw data. Even more open are

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Blocklancer and Ethlance, which use smart contracts and thus its business logic is transparent. Compared with this, Dmarket uses a private blockchain and offers reading access to the transactional data, which is close to a public blockchain. Additionally, most of the platforms are open source, so anyone interested can examine the code. However, in most cases the platform operator does not give insights to the running systems.

Table 3. Results of the case analysis

Steemit	Dmarket	Blocklancer	Ethlance
Dimension Governance structure			
Mechanisms	*Governance structure, decision rights, ownership*		
Semi-centralized; decision rights shared, ownership central	Semi-centralized; decision rights shared, ownership central	Semi-centralized; decision rights shared, ownership central	Decentralized; decision rights shared, ownership distributed
Dimension Resources & documentation			
Mechanisms	*Transparency, Boundary resources*		
Documentation, APIs	Light documentation, APIs	Documentation, tokens, blockchain	Light documentation, blockchain
Dimension Accessibility & control			
Mechanisms	*Accessibility, openness, process control*		
Identity verification & waiting time; Smart Contracts; public blockchain	No restrictions; private blockchain with reading access	Buy-in & waiting time; Smart Contracts; Public blockchain	Cryptocurrency (Ether), Smart Contracts; public blockchain
Mechanisms	*Input control, securing*		
Community standards; "Special user groups"	None	Community standards	None
Mechanisms	*Output control, monitoring*		
Up- & Downvotes; incentives	Profiles	Profiles, ratings; incentives	Profiles, experiences
Dimension Trust & perceived risk			
Mechanisms	*Strengthen trust, reduce perceived risk*		
Delegation of decision rights	Underlying technology	Shared governance accountability	Underlying technology
Dimension Pricing			
Mechanisms	*Pricing*		
Fees (Marketing, Donations)	Fees by seller	Fees by freelancers; costs of carrying for tokens	Transaction fees
Dimension External relationships			
Mechanisms	*External relationship management*		
Strategic partnership with underlying technology	Dependency on underlying technology	Dependency on underlying technology	Dependency on underlying technology; Strategic

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In process control smart contracts are used. By this, processes might be frozen and cannot be changed easily, e.g., without a migration to a new smart contract. A different form of decentralized process control occurs at Blocklancer. It uses the dispute mechanism for controlling the payment processes and has a decentralized form of process control.

For the mechanisms input control and securing only half of the analyzed platforms use community standards. Only Steemit goes one step further and delegates the input control to groups of users.

For the mechanisms output control and monitoring all platforms use profiles. Additionally most of them use related features, like ratings, experiences or up- and downvotes. The use of incentives for output control is used by Steemit and Blocklancer. Both stimulate their output by this.

Trust & perceived risk: The platforms use transparency of transactions for building trust, so anyone is able to view the data. The same transparency occurs for business logic by using smart contracts. Additionally, a distributed system hosts the data instead of a single platform owner. Hence, in a public blockchain system anyone can access the pseudonymized data. Furthermore, the platforms delegate the prevention of data manipulations to the users by different consensus mechanisms. One-step further goes Blocklancer, which also delegates parts of the governance structure in form of the dispute mechanism and Steemit, which delegates some decision rights to token holders.

Pricing: The platforms use advertising, subscription and transaction fees. Thereby, Dmarket and Blocklancer charge only one side of its market (seller or freelancers). Additionally, costs of carry occur for tokens, which have to be hold, e.g., for participating in the dispute mechanism.

External relationships: This last dimension shows dependencies on the underlying blockchain technology. Steemit uses its own blockchain technology and therefore has to participate in the ongoing development of it. Dmarket uses an external framework. Hence, it is dependent on its owner. In contrast, Blocklancer and Ethlance use the widely used blockchain Ethereum and are dependent from the community of open source development. In addition, some of the platforms have a strong and strategic relationship to other technology providers, like the peer-to-peer storing network InterPlanetary File System, or other strategic partners, like district0x for Ethlance.

5 Discussion

The objective of this article is to explore platform governance mechanisms, which are used in blockchain-based platforms. Therefore, we focus on the market-oriented perspective of platforms. Following the idea of shifting governance mechanisms caused by blockchain technology [21, 22], we apply a multiple case study using the platform governance mechanisms described by Hein et al. [27]. Hence, we identify new characteristics in several platform governance mechanisms, which are caused by

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blockchain-technology and shift parts of the governance from the platform provider to its users.

Altogether, the blockchain technology enables decentralized and distributed forms of decision rights and governance structures on platforms, but the ownership remains often at the platform operator. First, in case of governance structure the decision rights about the validity of the data and about disputes are shifted to the users of the platform. However, both depend on design features of the used type of blockchain and thus on the technological capabilities. Hence, Blocklancer and Ethlance have decentralized decision rights about the validity by using a blockchain with PoW as consensus while Steemit uses dPoS as consensus and has a semi decentralized form of decision rights. This semi decentralized structure can be shifted back to a centralized structure, if the chosen voters are controlled by a few users [53]. This also applies to the dispute mechanism of Blocklancer, which is based on the assumption of a distributed group. In case of Dmarket, which uses a kind of PBFT as consensus, there are no decentralized decision rights. Some of the platforms abandon the control over their source code by releasing it as open source. This can be interpreted as giving up the control and ownership of the platform [21]. Nevertheless, behind these open source communities might be a centralized control by funding, e.g., by hired developers [53].

In the research of platform governance the role of data as a boundary resource is underexplored [7]. By using blockchain technology, anyone can look into the data of a platform. Nevertheless, the data remains a kind of boundary resource and cannot be transferred easily outside of the platform and of the underlying blockchain. Additionally, tokens are a blockchain specific form of boundary resource, which can create a kind of lock-in effect. First, they are not easy transferable to other platforms or blockchains without intermediaries, like exchanges, and second, some decision rights or incentives might belong to their ownership.

The accessibility of the blockchain-based platforms do not differ from traditional ones, but there are differences in the transparency of them. In contrast to traditional platforms, they provide more insights into their transactional data. However, the degree of transparency depends on the type of used blockchain. By using a public blockchain anyone can view the transactional data while a federated or private blockchain does not provide this by default. For example, Dmarket provides these insights voluntary to anyone. This can also be provided with traditional technologies.

As previous research has shown, blockchain-based platforms do not delegate the specification of control mechanisms, but instead the accountability for control mechanisms is delegated to the blockchain, once the mechanisms are specified in the network [21], e.g., by the use of a smart contract. The platforms also provide incentives for output control to their users. For example, Steemit offers incentives for delivering content to the platform. Similarly, Blocklancer offers incentives for participation in its dispute mechanism. This is similar to other platforms, which use rewards for output control [9].

The perceived trustworthiness of the analyzed platforms is based mainly on the use of blockchain-technology. Due to its transparent design, it can be seen as a trust-free system [56]. Thereby the trust in the technology depends among others on its

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decentralization and transparency [57], but also on usage-related, personal and boundary factors [58]. Additionally, there is also a need for trust in the blockchain operators or developers [49]. The same applies to the provider of the user's frontend, which uses traditional technologies. Instead of a shift from trusting people or institutions to trusting algorithms [59], the opposite might occur by a shift from trusting algorithms to trusting platforms.

The pricing of the analyzed platform is mainly based on transaction costs and does not differ from traditional platforms. Thereby, Dmarket and Blocklancer charge just one side of a market and therefore enhance network effects on the other side. This strategy is known from other platforms [29].

The analyzed blockchain-based platforms have crucial external relationships to their underlying blockchain technologies. Hence, they are dependent on these, like firms building their businesses on free and open source software.

Summarizing blockchain specific characteristics could be determined in the dimensions *Governance structure*, *Accessility & control* and *Trust & perceived risk*, whereas the dimensions *Resources & documentation*, *Pricing* and *External relationships* only have minor specific characteristics, which are largely not only based on blockchain technology. The blockchain specific mechainsms shift parts of the governance to the users of the platform and thus the platform owner, if it exists, gives up control over its platform. Thereby, the analyzed platforms for the most part do not give up control over the design of the platform. Thus, users can only control the platform within the conditions specified by the owner.

6 Conclusion and Outlook

In this article, we analyze governance mechanisms of blockchain-based platforms using a case study. For this, we take research on platform governance as a basis and select four market-oriented platforms for the analysis, which use blockchain-technology as a key feature. Thus, governance mechanisms emerging by the use of blockchain-technology can be identified and the research on platform governance and blockchain-technology can be expanded in several ways. For research on platform governance specific characteristics of governance mechanisms occurring by blockchain-technology can be detected, e.g., tokens as boundary resources. For research on blockchain-technology on the other hand, some of the technological capabilities can be related to governance on platforms.

However, this study leads to some future research questions and has limitations. Besides general limitations of case studies, like a subjective interpretation by the researchers, only public available data is used. Next, future research should include potential novel characteristics of governance mechanisms, e.g., forks for resolving different views on decisions [21]. Additionally, we suggest an extensive analysis of single governance mechanisms in order to generate detailed insights, like tokens as boundary resources or influence factors of trust in blockchain-based platforms. This is also in line with Schreieck et al. [7], who motivated for future research on boundary resources as a platform governance mechanism. Also insights into the distribution of

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decision rights can be achieved by mining and analyzing the ledger of underlying public blockchains.

References

1. Gawer, A., Cusumano, M.A.: Industry platforms and ecosystem innovation. Journal of product innovation management 31, 417–433 (2014)
2. Dhar, V., Stein, R.M.: FinTech platforms and strategy. Communications of the ACM 60, 32–35 (2017)
3. Zhu, F., Furr, N.: Products to platforms: Making the leap. Harvard Business Review 94, 72–78 (2016)
4. Forbes: The World's Largest Public Companies, https://www.forbes.com/global2000/list/ (Accessed: 14.08.2019)
5. Eisenmann, T., Parker, G., van Alstyne, M.W.: Strategies for two-sided markets. Harvard Business Review 84, 92 (2006)
6. Gawer, A. (ed.): Platforms, markets and innovation. Edward Elgar, Cheltenham (2009)
7. Schreieck, M., Wiesche, M., Krcmar, H.: Design and Governance of Platform Ecosystems-Key Concepts and Issues for Future Research. ECIS Proceedings (2016)
8. Tiwana, A.: Platform ecosystems. Aligning architecture, governance, and strategy. Morgan Kaufmann, Waltham, MA (2014)
9. Tiwana, A., Konsynski, B., Bush, A.A.: Research Commentary —Platform Evolution. Coevolution of Platform Architecture, Governance, and Environmental Dynamics. Information Systems Research 21, 675–687 (2010)
10. Evans, D.S.: Governing Bad Behavior By Users of Multi-Sided Platforms. Berkeley Technology Law Journal 27 (2012)
11. Swan, M.: Blockchain: Blueprint for a new economy. O'Reilly Media, Inc (2015)
12. Nofer, M., Gomber, P., Hinz, O., Schiereck, D.: Blockchain. Business & Information Systems Engineering 59, 183–187 (2017)
13. Morabito, V.: Business innovation through blockchain. The B3 perspective. Springer International Publishing, Cham (2017)
14. Mattila, J.: The Blockchain Phenomenon – The Disruptive Potential of Distributed Consensus Architectures. ETLA working papers No. 38
15. Gatteschi, V., Lamberti, F., Demartini, C., Pranteda, C., Santamaria, V.: To blockchain or not to blockchain: That is the question. IT Professional 20, 62–74 (2018)
16. Shermin, V.: Disrupting governance with blockchains and smart contracts. Strategic Change 26, 499–509 (2017)
17. Hans, R., Zuber, H., Rizk, A., Steinmetz, R.: Blockchain and Smart Contracts: Disruptive Technologies for the Insurance Market. AMCIS Proceedings (2017)
18. Holotiuk, F., Pisani, F., Moormann, J.: The Impact of Blockchain Technology on Business Models in the Payments Industry. Wirtschaftsinformatik Proceedings (2017)
19. Wörner, D., Bomhard, T.V., Schreier, Y.-P., Bilgeri, D.: THE BITCOIN ECOSYSTEM: DISRUPTION BEYOND FINANCIAL SERVICES? ECIS Proceedings (2016)
20. Tapscott, D., Tapscott, A.: Blockchain revolution. How the technology behind Bitcoin is changing money, business, and the world. Portfolio/Penguin, New York, New York (2016)

https://doi.org/10.30844/wi_2020_b1-werner

21. Beck, R., Müller-Bloch, C., King, J.L.: Governance in the Blockchain Economy: A Framework and Research Agenda. Journal of the Association for Information Systems 19, 1020–1034 (2018)
22. Miscione, G., Ziolkowski, R., Zavolokina, L., Schwabe, G.: Tribal Governance: The Business of Blockchain Authentication. HICCS Proceedings (2018)
23. Reuver, M. de, Sørensen, C., Basole, R.C.: The digital platform. A research agenda. Journal of Information Technology 89, 116 (2017)
24. Thomas, L.D.W., Autio, E., Gann, D.M.: Architectural Leverage. Putting Platforms in Context. Academy of Management Perspectives 28, 198–219 (2014)
25. Baldwin, C.Y., Woodard, C.J., others: The architecture of platforms. A unified view. In: Gawer, A. (ed.) Platforms, markets and innovation, pp. 19–44. Edward Elgar, Cheltenham (2009)
26. Eisenmann, T., Parker, G., van Alstyne, M.: Platform envelopment. Strategic Management Journal 32, 1270–1285 (2011)
27. Hein, A., Schreieck, M., Wiesche, M., Krcmar, H.: Multiple-Case Analysis on Governance Mechanisms of Multi-Sided Platforms. In: Nissen, V., Stelzer, D., Straßburger, S., Fischer, D. (eds.) Multikonferenz Wirtschaftsinformatik (MKWI) 2016. Technische Universität Ilmenau, 09. - 11. März 2016. Universitätsverlag Ilmenau, Ilmenau (2016)
28. Nambisan, S.: Information technology and product/service innovation: A brief assessment and some suggestions for future research. Journal of the Association for Information Systems 14, 215 (2013)
29. Bakos, Y., Katsamakas, E.: Design and Ownership of Two-Sided Networks: Implications for Internet Platforms. Journal of Management Information Systems 25, 171–202 (2008)
30. Benlian, A., Hilkert, D., Hess, T.: How open is this platform? The meaning and measurement of platform openness from the complementors' perspective. Journal of Information Technology 30, 209–228 (2015)
31. Ghazawneh, A., Henfridsson, O.: Balancing platform control and external contribution in third-party development: the boundary resources model. Info Systems J 23, 173–192 (2013)
32. Ondrus, J., Gannamaneni, A., Lyytinen, K.: The impact of openness on the market potential of multi-sided platforms: a case study of mobile payment platforms. Journal of Information Technology 30, 260–275 (2015)
33. Boudreau, K.: Open Platform Strategies and Innovation: Granting Access vs. Devolving Control. Management Science 56, 1849–1872 (2010)
34. Kirsch, L.J.: Portfolios of Control Modes and IS Project Management. Information Systems Research 8, 215 (1997)
35. Hurni, T., Huber, T.: The interplay of power and trust in platform ecosystems of the enterprise application software industry. ECIS Proceedings (2014)
36. Armstrong, M.: Competition in two-sided markets. The RAND Journal of Economics 37, 668–691 (2006)
37. Tan, B., Pan, S.L., Lu, X., Huang, L.: The role of IS capabilities in the development of multi-sided platforms: the digital ecosystem strategy of Alibaba. com. Journal of the Association for Information Systems 16, 248–280 (2015)
38. Selander, L., Henfridsson, O., Svahn, F.: Capability Search and Redeem across Digital Ecosystems. Journal of Information Technology 28, 183–197 (2013)
39. Kannengießer, N., Lins, S., Dehling, T., Sunyaev, A.: What Does Not Fit Can be Made to Fit! Trade-Offs in Distributed Ledger Technology Designs. HICCS Proceedings (2019)

https://doi.org/10.30844/wi_2020_b1-werner

40. Fridgen, G., Radszuwill, S., Urbach, N., Utz, L.: Cross-Organizational Workflow Management Using Blockchain Technology-Towards Applicability, Auditability, and Automation. HICCS Proceedings (2018)
41. Luu, L., Chu, D.-H., Olickel, H., Saxena, P., Hobor, A.: Making smart contracts smarter. Proceedings of the 2016 ACM SIGSAC Conference on Computer and Communications Security, 254–269 (2016)
42. Zheng, Z., Xie, S., Dai, H.-N., Chen, X., Wang, H.: Blockchain challenges and opportunities: A survey. International Journal of Web and Grid Services 14, 352–375 (2018)
43. Peters, G.W., Panayi, E.: Understanding Modern Banking Ledgers Through Blockchain Technologies: Future of Transaction Processing and Smart Contracts on the Internet of Money. In: Tasca, P., Aste, T., Pelizzon, L., Perony, N. (eds.) Banking Beyond Banks and Money, 19, pp. 239–278. Springer International Publishing, Cham (2016)
44. Siba, T.K., Prakash, A.: Block-Chain. An Evolving Technology. Global Journal of Enterprise Information System 8, 29–35 (2016)
45. Risius, M., Spohrer, K.: A Blockchain Research Framework. Business & Information Systems Engineering 59, 385–409 (2017)
46. Rückeshäuser, N.: TYPOLOGY OF DISTRIBUTED LEDGER BASED BUSINESS MODELS. ECIS Proceedings, 2202–2217 (2017)
47. Beck, R., Müller-Bloch, C.: Blockchain as Radical Innovation: A Framework for Engaging with Distributed Ledgers as Incumbent Organization. HICCS Proceedings (2017)
48. Abramova, S., Böhme, R.: Perceived Benefit and Risk as Multidimensional Determinants of Bitcoin Use: A Quantitative Exploratory Study. ICIS Proceedings (2016)
49. Glaser, F.: Pervasive Decentralisation of Digital Infrastructures: A Framework for Blockchain enabled System and Use Case Analysis. HICCS Proceedings (2017)
50. Glaser, F., Bezzenberger, L.: Beyond Cryptocurrencies - A Taxonomy of Decentralized Consensus Systems. ECIS Proceedings (2015)
51. Brenig, C., Schwarz, J., Rückeshäuser, N.: VALUE OF DECENTRALIZED CONSENSUS SYSTEMS – EVALUATION FRAMEWORK. ECIS Proceedings (2016)
52. Ziolkowski, R., Miscione, G., Schwabe, G.: Consensus through Blockchains: Exploring Governance across inter-organizational Settings. ICIS Proceedings (2018)
53. Hsieh, Y.-Y., Vergne, J.-P.J.P., Wang, S.: The internal and external governance of blockchain-basedorganizations: Evidence from cryptocurrencies. In: Campbell-Verduyn, M. (ed.) Bitcoin and beyond. Cryptocurrencies, blockchains, and global governance, pp. 48–68. Routledge, London, New York (2018)
54. Yin, R.K.: Case study research. Design and methods. SAGE, Los Angeles (2009)
55. Recker, J.: Research Methods. In: Recker, J. (ed.) Scientific Research in Information Systems, 36, pp. 65–110. Springer Berlin Heidelberg, Berlin, Heidelberg (2013)
56. Beck, R., Stenum Czepluch, J., Lollike, N., Malone, S.: Blockchain-the gateway to trust-free cryptographic transactions. ECIS Proceedings (2016)
57. Sas, C., Khairuddin, I.E.: Design for trust: An exploration of the challenges and opportunities of bitcoin users. CHI Proceedings, 6499–6510 (2017)
58. Ostern, N.: Do you trust a trust-free transaction? Toward a trust framework model for blockchain technology. ICIS Proceedings (2018)
59. Antonopoulos, A.: Bitcoin security model: trust by computation, http://radar.oreilly.com/2014/02/bitcoin-security-model-trust-bycomputation.html (Accessed: 15.08.2019)

https://doi.org/10.30844/wi_2020_b1-werner