Trust in Blockchain-Technology in a Sharing Economy

Dr. Josef Bergt LL.M.

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Table of Contents

1 Intro

1.1 Scope

This article shall at first give a brief overview of the blockchain technology and a potential range of its applications under the premise of a decentralized technological environment. The article shall then point out the fundamentals of a sharing economy, outline the mechanics of trust in intermediating technology platforms and finally show where disruptive technologies such as the decentralized blockchain technology may have an impact on a sharing economy, as set out by the research issue pursuant to the below section.

1.2 Research Issue

The above introduction to and outline of the topic at hand *"Trust in Blockchain-Technology in a Sharing Economy"* leads to the following research question: *"What is the role of the economically defined 'trust' when it comes to blockchain technology, more specifically do 'trust-less' decentralized technological environments exist?"*, as well as the sub-question: *"What is the potential impact of blockchain technology as a model of trust on a sharing economy?"* This essay is theoretical-conceptual in its approach. 1

2 Distributed Ledger Technologies

A blockchain is one of several variations of the distributed ledger technology. A blockchain may be described as a database which is in general both public and decentralized and which also stores data in a permanent manner. This typically occurs through transactions of tokens which represent a specific economical value (either an underlying asset which is being represented or the actual token itself, as is the case with a bitcoin, which basically derives its value from supply and demand) (Bergt, 2020, p. 6 et seq.). Transactions on a blockchain are carried out through decentralized apps, so-called smart-contracts, which are mostly based on "if-then-else" instructions, meaning if a condition "A" occurs, action "B" is executed, otherwise another action "C" will be carried out. (Bergt, 2020, p. 10 et seq.). Possible transactions on a blockchain are either carried out peer-to-peer, human-to-machine or machine-to-machine (Mehrwald, Treffers, Titze, Welpe, p. 4585, 2019). 2

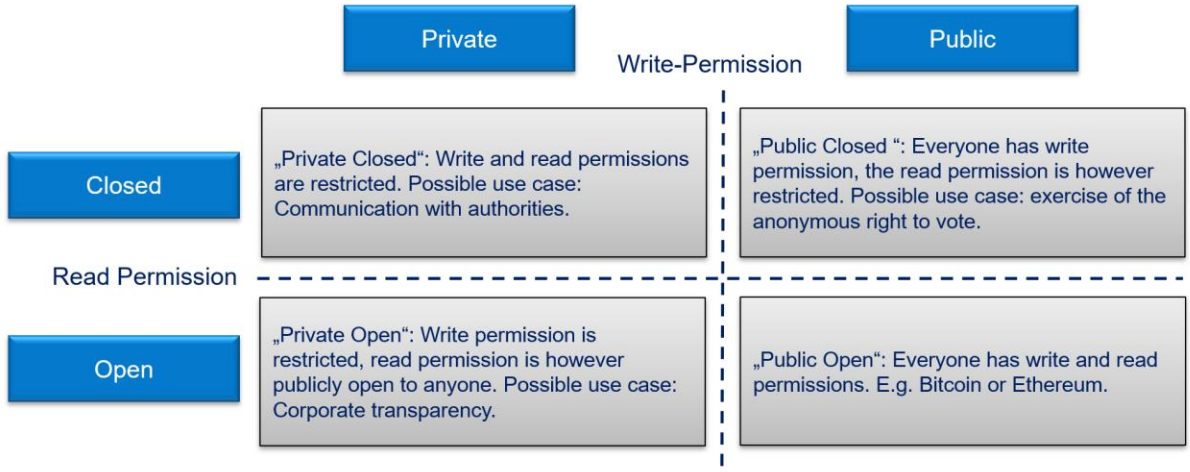
While the "public" aspect of a blockchain implies that, on it every stored transaction may be viewed publicly, the factor of "permanence" is the result of a cryptographic hash function (without going into technological details, broadly speaking the hash function results in a unique value 3

or identifier, which in turn leads to e.g. a transaction on a blockchain to being permanent). This aspect prevents corruption of transactions on a blockchain. The immutability of transactions on a blockchain is further ensured by decentralization. "Decentrality" refers to a large number of network participants, so-called nodes, in a peer-to-peer network which constantly synchronize data. As the name "decentralized network" suggests, a central instance, which is responsible for a (centralized) data storage system, does not exist on a standard public and open blockchain. The loss of a single network participant or network node does not per se endanger the functionality of the decentralized network as a whole (Bergt, 2020, p. 7).

4 However, not all blockchains are public. Differentiation is necessary between "private" and "public" blockchains as well as between "open" and "closed" blockchains. The pair of values "private" and "public" refers to writing permission while the values "open" and "closed" refer to the reading permission. Both, the Bitcoin as well as the Ethereum protocols are public and open blockchains, which means that everyone can access and "read" the network protocol as well as "write" in the database (i.e., transfer tokens) (Bergt, 2020, p. 7, fn. 16).

5 While for example anonymous voting may be realized best through a public closed blockchain the general communication with authorities would be most suitable to be carried out on a private closed blockchain. When it is, for example, the aim to communicate the business conduct of a company in a transparent manner, a private open blockchain may be a feasible technological implementation to achieve this goal (cp. Bergt, 2020, p. 7, fn. 16).

6 For better understanding, compare the following figure:



Josef Bergt, 2020

To conclude, blockchain technology – in an ideal scenario – allows for permanent, tamper-proof and distributed record-keeping and transfer of values and ensures consensus through cryptographic mechanisms (Böhme, Christin, Edelman, Moore, 2015, p. 213 et seqq.; Glaser, 2017, p. 1543 et seqq.). 7

2.1 Blockchain as an intermediating Technology

Different read and write permissions on a blockchain may lead to different use cases or different ways of conferring value in a shared economy through a technology which to some extent may replace the otherwise required trust in an intermediary, with the then required trust in the decentralized technology or network. One might therefore also be misled into calling this model of trust, "trust-less" technology, which is seemingly erroneously propagated by Nägele (2020, Section 4.2.5). (2018). As Hawlitschek, Notheisen and Teubner (2018) have concluded, "*blockchain technology is to some degree suitable to replace trust in platform providers*". However, it does not make the trust in intermediaries (institution-based trust) obsolete as will be elaborated in this article. Furthermore, even conceptualized trust-free systems based on blockchain technology *"will crucially depend on the development of trusted interfaces for blockchain-based sharing economy ecosystems"* in the first place (Hawlitschek et al., 2018). Ultimately, rendering the notion of a completely trust-free system, much less a trust-less system, an illusion. 8

However, as Mehrwald et al., 2019, p. 4585, point out *"[c]ombining blockchain technology and smart contracts has the potential to facilitate disintermediation and realize true peer-to-peer transactions provided that sufficient trust is build."* Blockchain technology therefore is not void of trust or "trust-less". On the contrary, there are different targets of trust as will be explained under Section 3. in more detail which play a major role even when it comes to distributed ledger technologies. Blockchain thus mediates trust and consequently facilitates disintermediation. If at all, blockchain shall not be called a "trust-less" but a "disintermediated", or better yet, an "(trust) intermediating" technology. 9

2.2 Sharing Economy

The term "sharing economy" is oxymoronic in its nature contrary to the standard commercial economy. While sharing radically simplified refers to the allocation of assets to third parties, without the shared resource having a dedicated owner and the contribution being measured in money (e.g. Wikipedia), an economy is basically understood as a system of trade and exchange which ideally generates an added value to the parties of the exchange and thus poses a means 10

to the accumulation and utilization of value, typically money (Belk, 2014a, p. 7 et seqq.; Belk, 2014b, p. 1595 et seqq., Mehrwald et al., 2019, p. 4586).

11 Historically, the sharing economy meant the usage of assets without actually owning them through borrowing or renting as mentioned above, leading to a form a so-called "collaborative consumption" (cp. Lessig, 2008, p. 116 et seqq.; Belk, 2014b, p. 1595 et seqq.). However, the use of the internet also led to a commercialization of the sharing economy, aside from the non-profit sharing economy (Belk, 2014b, p. 1595 et seqq.). Due to the lack of a commonly accepted definition of a sharing economy, Mehrwald et al., 2019, p. 4586, suggest to follow Perren and Kozinets' approach of so-called lateral exchange market or LEM, which they define as *"[...] a market that is formed through an intermediating technology platform that facilitates exchange activities among a network of equivalently positioned economic actors."* These LEM exclude "sharing and gifts" (Perren, Kozinets, 2018, p. 21).

12 This definition perfectly describes the peers of a sharing economy or of such a lateral exchange market and how there is no hierarchy between the actors as they are positioned horizontally, on an equivalent economic level.

13 Furthermore, the reference to the intermediating technology platform, makes clear that the exchange on such an exchange market occurs in a bilateral manner, between two parties or peers (human-to-human), whether the respective contracting party is disclosed or not by the intermediating technology platform does not change its bilateral nature from a legal point of view. While from a technological point of view it is possible to disrupt the balance of peers and introduce a hierarchy, the abovementioned model does not take such multilateral exchanges into account, where the interests of buyers and sellers are matched by an intermediary. With regard to a LEM a multilateral exchange market may only be recognized if the intermediating technology platform is taken into account (human-machine-human).

14 This is in line with the so-called concept of decentralized exchanges or DEX, on which crypto-assets (tokens) may in general be traded without an intermediary but through an intermediating technology platform (cp. Bergt, 2020, p. 248 et seq.).

15 As Mehrwald et al., 2019, p. 4585, emphasize, blockchain technology may replace an intermediary and enable *"direct peer-to-peer transactions in the sharing economy"*. Though it should also be noted that peer-to-peer systems as a form of a sharing economy are not an entirely new feature which the blockchain technology has given rise to, but as pointed out already, peer-to-peer systems are at least as old as the internet. Torrent networks also work in a decentralized

manner, however they allow the spreading of content by multiplication (e.g., licensed works such as music, movies, games, etc.), whereas with blockchain protocols in general so-called "states" which contain information may be transferred or broadcasted only once by the person authorized to dispose of a specific token (Bergt, 2020, p. 8).

16 While replacement of intermediaries through blockchain technology is possible from a technological point of view (Mehrwald et al., 2019, p. 4585; Filippi, 2017, p. 2; Sundararajan, 2016, p. 59), several issues may arise when utilizing blockchain technology from a legal and in particular from a regulatory point of view, for example when trading financial instruments in form of tokens (tokenized securities) by utilizing blockchain technology (cp. Bergt, 2020, p. 377 et seqq. For the legal outlook). *"With the advent of blockchain technology on the financial market, even highly regulated markets such as multilateral trading venues can be more efficiently organized. The blockchain technology thus enables a reduction of the density of regulation with at least the same efficiency in the fight against market failures [...]."* (Bergt, 2020, p. 377).

17 Regulation usually is enacted by the legislator to ensure trust in intermediaries and the functioning of an intermediated and otherwise inefficient market. However, the regulation itself also causes costs and therefore poses a form of market inefficiency. These regulatory costs may be lowered by a great deal through intermediating technology platforms such as the described LEM. Multilateral trading venues like stock exchanges could in theory be realized through the abovementioned decentralized exchange where a financial intermediary such as a multilateral or organized trading facility (MTF/OTF), which is the private law equivalent of a stock exchange under public law, is being replaced by an intermediated technology platform (e.g. blockchain technology and smart contracts). *"The role of a risk-free intermediary, which brings together the buying and selling interests, is represented by a technological instance [intermediating technology platform]. Financial market players such as investment firms - (OTC) market makers or systematic internalizers - can also participate on a DEX."* (Bergt, 2020, p. 378). On the opposite site, it should also be considered, that while blockchain technology may lower regulatory costs and even transaction costs, transactions are essentially still slow, scalability is still an issue and both development and implementation of a cryptographic permanent, tamper-proof and distributed consensus network, which does away with a centralized intermediating authority, is potentially very costly both in time and money. To sum it up with the arguments of Ahangama and Poo (2019, pp. 165 et seqq.), blockchain-based systems and their immutable predefined set of rules have to be accurate, reliable and secure from the outset.

18 Lastly, as Mehrwald et al., 2019, p. 4585, put it, *"replacing organizational tasks with a new technology* [still] *requires trust."* This aspect shall be discussed in more detail hereinafter.

3 Trust in intermediating Technology Platforms

3.1 Concepts of Trust

19 As Blau concluded, 2017, p. 112 et seq.: *"Economic institutions, such as the impersonal market and the contract that stipulates the precise terms of the exchange, are designed to separate concern with distinct objects of exchange from other considerations and to specify the exact obligations incurred in a transaction, thus maximizing the possibility of rational calculations. Social exchange, in contrast, involves unspecified obligations, the fulfillment of which depends on trust because it cannot be enforced in the absence of a binding contract."*

20 Consequently, established economic institutions alongside with contractual relationships create trust. Inefficient markets on the other hand alongside with legal shortcomings in agreements and the potential lack of enforceability of such an agreement diminish the generated trust. As quoted in the paragraph above, a certain level of trust is thus required for the fulfillment of reciprocal obligations.

21 More generally, *"Trust is conceptualized as a set of specific beliefs between parties that include integrity/sincerity/honesty, benevolence, ability/competence/expertise, and predictability of another part, or a willingness to be vulnerable to the actions of another person or people."* (Dakduk, Santalla-Banderali, Siqueira, 2020, p. 5 with further references).

22 As Mehrwald et al., 2019, p. 4586, put it, with further references: *"Given Trustworthiness* [sic!], *trust represents behavioral intentions of an individual that would increase the vulnerability to other parties on the conditions of interdependence and vulnerability."*

23 Transactions on lateral exchange markets usually occur only once between parties and no on-going business relationship develops between the same parties. This is why trust plays an essential role on lateral exchange markets and consequently also on markets utilizing blockchain technology (Gefen and Straub, 2004, p. 407 et seqq.).

24 The role of trust on peer-to-peer markets is so essential, that it was titled the *currency* of such markets. Trust is in fact one of the most important factors when it comes to participation on such peer-to-peer platforms or markets, the platforms success in general as well as the conclusion and fulfillment of transactions (Hawlitschek, Teubner, Gimpel, 2016a, p. 4782 et seqq. and

Strader, Ramaswami, 2002, p. 45 et seqq. quoted after Mehrwald et al., 2019, p. 4586). As a logical consequence, trust plays the same crucial role on intermediating technology platforms such as blockchain driven platforms or markets, as these platforms intersect with peer-to-peer markets.

"Hence trust is regarded as the most effective complexity- and vulnerability-reduction mechanism." (Corbitt, Thanasankit, Yi, 2003, p. 203 et seqq., quoted after Mehrwald et al., 2019, p. 4586, with further references). 25

In traditional economic exchange settings of business-to-consumer commerce, the primary trust target is the vendor (vertical trust level) and the trust in the product, whereas with peer-to-peer markets other trust targets manifest, while others receive a more substantial role. A new trust target would be the trust in peers (who then becomes the vendor, but on a horizontal trust level – cp. the definition in marginal note 11, *equivalently positioned economic actors*), while the trust targeted towards the platform receives a more independent character from the trust in the vendor of the traditional model (Hawlitschek, Teubner, Weinhardt, 2016b, p. 28 et seqq., Mehrwald et al., 2019, p. 4587). 26

3.1.1 Trust Target: Peers

Gefen (2000, p. 725 et seqq.) defines that with regard to e-commerce trust in a vendor by a consumer depends on how trustworthy the latter deems the former. This definition is built on the concept of *"trust as a social complexity-reducing mechanism"* by Luhmann (1979). This mechanism describes a *"willingness to depend on a vendor"*, as deduced from the notion of the vendor meeting its obligations (Gefen and Straub, 2004, p. 410). 27

This model of e-commerce may also be applied to peer-to-peer markets. Recent studies in that regard by Costello and Reczek (2020, p. 22 and 35) reveal that peer-focused marketing (what is defined as provider-focused marketing communications by Costello and Reczek) leads to a higher *"willingness to pay"* by consumer as they put themselves in the proverbial shoes of the provider, what is described as the *"empathy lens"* in the abovementioned studies. 28

This *"willingness to pay"* essentially also indicates trust in the peer, although the studies were focused on a marketing point of view. The concept may in general be extrapolated from peer-to-peer markets where the platform is operated by a central provider to intermediating technology platform economies; although further studies in this regard would be necessary. 29

30 Another interesting realization by Costello and Reczek (2020, p. 35) is that consumers on a peer-to-peer market (with a central provider) perceive *"purchases from for-profit matchmakers as helping an individual provider."*

31 Such opportunistic behavior by peer-to-peer platform operators along with the above misconception of consumers may be avoided on an intermediating technology platform market altogether. These musings also pave the way for further notions on trust in platforms, whether they are run by a single provider or through the hive-mind consensus of a blockchain-based sharing economy (institution-based trust; cp. section 3.1.2).

32 Interestingly enough, Costello and Reczek (2020, p. 35 et seq.) reach the conclusion that when marketing is focused on a peer-to-peer platform (which is provided by a central operator), consumers have the mindset that an exchange of performance and consideration with a firm takes place; this is what the authors of the article call *"exchange lens"*. These results make further studies of the same kind with regard to intermediating technology platform markets necessary, to show, whether consumers still think they are contracting with a firm and how trust is built towards the decentralized platform and its peers.

33 Mehrwald et al. (2019, p. 4588) argue that *„trust in the platform is regarded as a predictor of trust in the peer"*, as the decentralized intermediating platform needs to be trustworthy in order to gain acceptance by peers. Thus, a trust hierarchy is conceived. Trust in (anonymous) peer and consequently in the product largely depend on trust in the intermediating technology platform.

3.1.2 Trust Target: Platform / Intermediating Technology Platform

34 The generally accepted pillars of trust are broken down into ability, integrity and benevolence as mentioned above already. Ability refers to a platform successfully, securely and reliably matching buying- and selling-interests of participants or parties, processing of transactions and an intuitive graphical user interface (Hawlitschek, Teubner, Adam, Möhlmann, Borchers, Mareike, Weinhardt, 2016c). Whereas the integrity and benevolence address the applicable fees, data privacy, authenticity of listed orders as well as potential (integrated) user support (Mehrwald et al. (2019, p. 4588 with further references).

35 The trust in the (intermediating technology) platform may to some extent then actually replace the trust in peers with regard to ability (to perform), integrity (sincerity, reliability) and benevolence (considering the other party's interest), as transactions are executed via a pre-defined set

of rules written in the programming code of smart contracts. Therefore, the trust required for the intermediating technology platform, the trust in technology, needs to be essentially larger. In short, such a platform essentially needs to meet the expectations of its peers (as consumers) that other peers (as providers) will perform as agreed upon, but also the expectations of peers (both providers and consumers) in the intermediating technology/platform to settle disputes and to support peers if something goes wrong before, during or after a transaction.

That being said, trust in peer networks is also generated without classical intermediaries, which is called "consociality" (cp. Mehrwald et al., 2019, p. 4588 with further references). 36

Perren and Kozinets (2018, p. 20 et seqq.) have voiced that trust among equivalent economic actors may depend on so-called "structural assurances" and intermediation on peer-to-peer markets. Consequently, intermediating technology platforms may heighten a consuming peer's trust that providing peers will not commit any opportunistic betrayal (Mehrwald et al., 2019, p. 4589). 37

3.1.3 Trust Target: Product

Pursuant to Comer, Plank, Reid, Pullins (1999, p. 62) product trust is defined as *"the belief that the product/service will fulfill its functions as understood by the buyer."* With regard to platforms following a sharing economy model, products are characteristically presented in a digital setting and on intermediating technology platforms the product is usually of virtual nature itself (e.g., a token representing rights or values). Thus, the product has to be functional regarding the agreed upon and promised properties. Hawlitschek et al. (2016b, p. 30 et seq.) therefore suggest *"that trust related to the product [...] has a special role in the context of C2C sharing economy platforms."* 38

4 Conclusions & Outlook

Blockchain technology itself may not be deemed "trust-less" but actually provides trust by design. Even though (trust) intermediating technology platforms may have a major impact on trust – from its creation to how it is perceived – trust in the platform (institution-based trust) is still present and even required for incentivizing intention to consume. 39

Errors in programming code of smart contracts and malignant activity exploiting faulty code may greatly diminish trust in such intermediating technology platforms or lateral exchange 40

markets (e.g., exploits or malicious hacking like the DAO or Parity Hack). Slow speed of transactions (cp. Beck, Czepluch, Lollike, Malone, 2016, p. 10) as well as issues with scalability pose further drawbacks on trust in the platform.

41 Nevertheless, on the positive side, blockchain based intermediating technology platforms have great potential in countering opportunistic behavior, which in turn greatly enhances trust in peers through trust in platform. Additionally, the technology has the potential to lower supervisory regulation on traditional (financial) markets (Bergt, 2020 p. 244).

42 Under the premise that a blockchain is technological secure, reliable and accurate, it may replace – at least up to a certain extent– the trust required in intermediaries (trust-free system). However, the notion that such a system or market are "trust-less" is wrong for the abovementioned reasons; trust-free systems may be conceptualized as demonstrated by Hawlitschek et al., 2018, but they still have their limits. A shifting of trust takes place, trust in technology is required instead of trust in (financial) intermediaries when it comes to decentralized intermediating technology platforms such as blockchain-based platforms (trust issue regarding technological aspects such as smart contracts and their broadcasters as well as the technological end-user interface, all of which may still be attributed to the sphere of institution-based trust).

43 As was already quoted at the beginning, blockchain based trust-free systems will therefore greatly depend on *"trusted interfaces for blockchain-based sharing economy ecosystems."* (Hawlitschek et al., 2018).

44 Lastly, with regard to how trust is built towards decentralized platforms and its peers and what this implies for potential marketing strategies on intermediating technology platform markets, further studies are required.

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