Can Blockchain Technology Solve Trust Issues in Industrial Networks?

Vincent Fremont[1, 2][0000-0001-5517-6394] and Gideon Mekonnen Jonathan[3][0000-0001-6360-7641]

[1] Gävle University, Faculty of Education and Business Studies, SE-80176 Gävle, Sweden
[2] Uppsala University, Department of Engineering Sciences, SE-75121 Uppsala, Sweden
[3] Stockholm University, Department of Computer and Systems Sciences, 164 07 Kista, Sweden
[1,2]Vincent.fremont@hig.se [2]gideon@dsv.su.se

Abstract. Since its inception about a decade ago, practitioners and researchers alike have been drawn to the blockchain technology vibe. Advocates of blockchain argue that the technology is taking us to truly 'trust-free' transactions. A long list of applications of blockchain has also been proposed in a relatively short period of time. However, a closer look into the literature reveals two shortcomings. To start with, the substantial proportion of the research on blockchain has focused on addressing the technical aspects of blockchain—design and features— as well as legal issues. However, there is a lack of knowledge on how blockchain technology can be used to solve practical problems faced by organizations in different sectors and industries—measurement and value, trust, management and organization. The state-of-the-art also shows that there is a dominance of conceptual and design-oriented research paradigms. To address this gap and respond to the calls for further research, this paper presents a research plan for a longitudinal case study to investigate whether blockchain technology can affect the way organizations conduct their business relationships.

Keywords: Blockchain, Digitalization, Industrial Marketing, Manufacturing Industry, Trust.

1 Introduction

The blockchain technology is already 10 years old, and it is still a widely misunderstood technology [1, 2]. A blockchain functions as a transaction ledger recording peer to peer value exchanges made via a mathematical and cryptographic protocol [3, 4]. This ledger is decentralized and distributed over a network of nodes, a network of computers, where each node contains a copy of the entire ledger. The network is supposed to keep an unalterable record of all transactions taking place via its network. The transactions are validated by miners, computers running a complicated cryptographic algorithm,

proving by their calculation work the validity of the data contained on the ledger [3]. At a pre-determined frequency, the miners validate a certain amount (or block) of transactions, which is added to the previous record (blocks) of transactions, therefore creating a chain of transaction records (a blockchain) [3]. The first proposed application of this technology was the Bitcoin protocol, a digital currency. The purpose of this digital currency is to allow digital financial transactions to be made without the need of controlling and validating institutional third parties, such as credit card companies or banks [3, 5, 6]. Because of its characteristics, the Bitcoin's blockchain technology is said to allow its users to make trust-free financial transactions. Transactions of digital tokens or coins are transparent and traceable. Because the Bitcoin's blockchain works as a distributed and open ledger, anyone with the appropriate knowledge and basic technological resources can trace the ownership of a specific token all the way back to its first emission. On the other hand, such absence of liable and controlling third parties might entail some new risks for currency users and society as a whole [7]. In order to maintain existing or to create new business relationships, organizations need trust and commitment [8, 9]. The blockchain has been developed in many applications around the postulate that it was a trust-free or trust less technology. It has been presented as such mostly because it is expected to remove the need for intermediaries, by creating information transparency and virtually eliminating the risks for transaction frauds for all parties involved in a given business relationship or transaction[10–12]. However trust is constructed by different parties of a given relationship, and is dependent on these parties' perception of the other's attributes such as competences, credibility, confidence and loyalty [13]. Therefor it appears evident that in order to investigate how the blockchain affects trust in inter-organizational relationships, one should conduct a socio-materialistic research that encompasses both the material structures and the actors' perceptions of the technology [14]. The purpose of this paper is to investigate the implementation of a blockchain technology in an organizational setting and its potential causal relationship with trust.

The research questions that the authors aim to address are the following:
1. How does the blockchain technology affect trust in inter-organizational relationships?
2. What are the mechanisms causing the blockchain to affect trust?

2 Theoretical Background

2.1 Blockchain

Since the introduction of the bitcoin protocol, the blockchain technology has been developed into more applications than just cryptocurrencies [5, 6, 15–19]. The technology has gained the attention of most large organizations. Potential blockchain applications for companies are plenty [20], and they could affect very diverse organizational aspects [4]. For instance, blockchain should allow sales and marketing managers to better address their customers, on an individual basis, by creating new applications that better record and make ubiquitous customer information [4]. As another example, in legal

affairs, companies will be able to develop smart contracts, not legal per se, but block-chain-based applications that emulate contracts logic, and which can automatically execute transactions according to different pre-defined conditions [4, 17]. Researchers have studied a great number of blockchain applications in different industry contexts, such as trust free transaction in the secondary car market, financial fraud prevention in public sector services, and smart contracts use for e-commerce platforms [1, 15–17, 20]. But as research also points out [6], there is also a lack of understanding of where and how this technology is actually applicable. The blockchain technology is still considered in its infancy and struggling to overcome a number of technical challenges, and while there is an obvious enthusiasm surrounding this technology and its possibilities, little is still known about how effective it really is in practice, and especially in the organizational context [10, 15, 19, 21–23].

2.2 Trust

The most cited fundamental feature of the blockchain technology is the fact that it makes the need for trust during transaction unnecessary [10, 24, 25]. Outside the academic setting, blockchain is also referred to as "the trust machine" which substitutes the trust dimension between individuals or organizations [12]. In a similar vein, Sun [26] argue that the blockchain technology can make it possible to build an economic system that could run without people, which could be considered "trust-free". Even though the technology is credited for lowering operational costs as well as improving the efficiency of transactions by eliminating intermediaries, the basic advantage of the technology is the provision of an alternative to the hurdle of forging relationships that are antecedent for trust. Contrary to what we know from management literature, the technology and design behind the blockchain are what makes trust-free business services possible. According to Sun [26], the transparency, as well as the privacy in the service, results in a relationship between human and technology. Since the model of trust is changed due to the blockchain technology, the relationship between individuals as well as between organizations is not based on the previously forged relationships. In other words, trust is diffused across entire population rather than being placed in an individual or an organization entity. On the other hand, we know from the literature, in a business or industry network, developing a business relationship always requires the development of commitment and trust between firms [8], which comes with a considerable cost in terms of time and money. For two business actors to be committed to a business relationship, trust needs to be forged and maintained. However, it is worth mentioning that developing trust takes time [8]. Therefore, it would be of interest to look at how the blockchain technology, a trust-less transaction technology, should affect current and future business relationships in industrial networks. Findings of previous studies provide theoretical conceptualisation with little evidence supported by empirical studies. Where available, studies looking into trust issues have focused on the technical aspect of the blockchain such as transparency, integrity of data as well as immutability of design [24]. It is no surprise that a review of the extant literature has revealed that the blockchain studies are primarily dominated by disciplines in the computer and information systems while research in business-related areas is scarce [2].

This justifies empirical studies conducted on industry networks, to investigate whether business relationships established via a blockchain application are really trust-less, if trust is still a need for the different actors, and if this type of relationship is more efficient presenting less friction, or not.

3   Methodology

Analysis of previous studies on the blockchain technology indicates that the most preferred research designs applied are conceptual in nature. According to Risius and Spohrer [2] there is a large proportion of studies that are based on design science methods and analytical investigations and that needs to be corroborated by empirical studies [2]. Hawlitschek [6] propose a variety of empirical studies that could be carried out using different qualitative and quantitative methodologies. Particularly, trust could be studied using case studies, surveys, experiments, as well as econometric analyses. Risius [2] also encourage researchers to undertake qualitative or quantitative data using primary data. Several case studies have been conducted to further our understanding of blockchain in different sectors, in for instance the financial industry [10], start-ups [27], and platform providers [28].

This study will take a sociomaterialistic ontological stance to investigate how the blockchain affects trust[14]. Furthermore, the study will also use a critical realist methodology to investigate the causal relationship between the blockchain technology and trust [14, 29]. Critical realism has a stratified ontology, composed of the real, the actual and the empirical[14, 30]. The real is real world, its objects and structures, which certain mechanisms express themselves or cause events in the actual, which the observer tries to observe and interpret in the empirical [14, 29, 30]. By retroduction research process, critical realism aims at establishing the causality between the real and the actual, by identifying the mechanisms by which certain objects causes certain events. For this study, a critical realist case study research strategy with interviews as a data collection method is chosen as the research problem—trust—involves a multilayered and complex research topic [6, 31, 32]. A critical realist case studies are found to be appropriate for studies that investigate complex issues involving multiple actors, processes and goals in depth while maintaining the overall characteristics of real-life events [32–34].

4   Contributions of the proposed study

As previous literature reviews and empirical studies have shown, the full potential of blockchain is not understood yet. Some of the questions that are yet to be answered include: How can the technology be applied in different sectors and across industries? and how should it be managed and be incorporated with other systems already in place? Can the technology exclude 'trust' issues between organizations and their customers, suppliers and other stakeholders? We have also shown that the majority of the studies on blockchain technology have focused on conceptual analysis and design of artefacts while little attention was given to empirical investigations that reflect the real

organizational issues in relation to blockchain. The findings of our study will contribute to practice and research by attempting to empirically test whether blockchain can play a role in the way organizations conduct their business relationships.

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