Decentralized Autonomous Organizations and Trust: Approach to Trust in DAO in the Context of Existing Trust Theory

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Abstract: We are witnessing how numerous trends, including decentralization and the growing role of technology, permeate the way companies are organized, intersecting with the phenomenon of Decentralized Autonomous Organizations (DAO). This technology-based organization carries a pattern known as a zero-trust policy, aiming to eliminate the need for trust in an organization. It appears to oppose the existing research on trust in management and its usefulness to organizations. That brings the question of whether DAOs represent a change from a trend defined by a standard trust theory. This conceptual paper answers by looking at the Decentralized Autonomous Organizations phenomenon through the existing knowledge on trust, specifically through Dirks & Ferrin's trust theory, and compares the concept with the traditional organization. The investigation suggests that DAOs only partially eliminate or transform the need for trust compared to traditional organizations; the need for trust is still present and may even grow in future concept development.

1. Introduction

1.1. Framing the Topic

With the evolution of management, new concepts of organizing entities and the individuals within them naturally come to reflect the demand of current stakeholders, typically leaders and members. One such concept is the contemporary phenomenon of Decentralized Autonomous Organizations (DAOs), which respond to the changed values following the crisis of trust in authority and consequently attempt to protect their participants. The concept follows the ongoing trend of decentralization in management affected by environmental uncertainty, the need for innovation, and a trust crisis, trying to reach a trust-free environment. The specificity of the DAO approach to trust, which seems to be in opposition traditional organization approach, predetermines this paper´s goal - finding if and how DAO shifts our current perception of trust in organizations (Conti, 2015; De Filippi et al., 2020; Gassmann & Zedtwitz, 2003; Hassan & De Filippi, 2021).

Decentralized Autonomous Organizations stand on the edge of two worlds: management and IT. Their origin is in information technology, from which they draw design elements, for

example, zero-trust policy from IT security, that are then transferred and applied in the management field, specifically organizational design (Buck et al., 2021; Liu et al., 2021). This paper analyses the approach to trust that DAOs bring from the technology world, how this approach fits into existing research, and the definition of trust. For this purpose, trust is framed as a "psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another" (Dirks & Ferrin, 2001). However, DAO itself overwhelmingly does not explicitly define trust within the academic literature (De Filippi et al., 2020).

1.2. Understanding DAO

Decentralized autonomous organizations are companies that have been developing in recent years, whose design aims to increase the degree of democracy and egalitarianism and avoid the need for a central authority in the form of managerial layers. It achieves the goal by using blockchain technology, which provides the organization's members with voting mechanisms applied to all decision-making, and smart-contract technology, which includes and automatically executes internal rules and agreements. Membership in an organization is represented by the token ownership issued by a DAO, which is written in the blockchain and gives the right to participate in the organization's decision-making. (Hassan & De Filippi, 2021)

The purpose and origin of this organization type is the distrust of traditional organizations and their central authorities, such as top management, and the desire to bring an alternative that does not condition the organization's functioning on trust in authority. Examples of specific DAO organizations are Steem or the DAO. Among the reasons to research decentralized organizations is that they represent a critical broader trend of democratization in organizations that is visible, especially in recent years, to an increased degree. It is also a remarkable example of how technology permeates and influences management on a massive scale. (Liu et al., 2021)

1.3. Understanding Trust

Although trust may be considered a virtue in the general public, in reality, it is a pragmatic survival mechanism that is beneficial both in child development and for the individual (Kramer, 2009). In the broadest framework, trust can be understood as the willingness to accept risk, considering that trust often leads to behaviors with increased cooperation (Dirks & Ferrin, 2001).

Organizations and their internal collaboration create complex dependencies between employees, and trust enables these employees to work together more effectively. Moreover, its importance increases with the development of organizational designs that bring greater independence and autonomy to employees and the associated decrease in control mechanisms. (Mayer et al., 1995)

1.4. Stating the Issue

The organizational governance mechanism that is part of the concept of Decentralized Autonomous Organizations has an inherent premise known as zero-trust policy or trust-less

governance. This tells us that when building a system (in our case, an organization), firms assume that each stakeholder is a potential threat to the others, and need for the trust should be avoided (Buck et al., 2021; Rikken et al., 2019). On the other hand, if we look at existing management research on trust, for example, in Kurt T. Dirks and Donald L. Ferrin's (2001) paper, where they summarize the findings of previous researchers, there is a strong consensus that "scholars from various time periods and a diversity of disciplines seem to agree that trust is highly beneficial to the functioning of organizations" (Dirks & Ferrin, 2001). Examples of these scholars are Costa (2003) and McEvily et al. (2003). The literature of the previous forty years leads us to believe that trust in organizations is something positive and desirable.

This paper aims to answer the research question of whether DAOs, unlike traditional organizations, succeeded in avoiding the need for trust in their inner functioning, so they represent a shift from current theories of trust in organizations. The topic has been specified as a gap in the research literature (Beck et al., 2018).

1.5. Stating the Background

Although the concept of Decentralized Autonomous Organizations is relatively young, several dozen academic publications have already addressed its mechanisms, applicability, and limitations (Hassan & De Filippi, 2021; Rikken et al., 2019). These publications look at the phenomenon mainly from a technological and legal perspective, although the organizational design perspective is also partially present (Liu et al., 2021). Paradoxically, the DAO literature often mentions trust or mistrust but rarely defines it (De Filippi et al., 2020).

DAOs are organizations in which leadership, member, and owner roles are not divided among individuals, but everyone participates in all of them. DAO's essential tools for internal operations are blockchain and smart contracts. What is significant is that the idea of blockchain is based on mistrust. It is a database whose specificity is that, unlike the standard ones, it does not lie centrally in one place but is distributed among many participants in the organization to reduce risks. A blockchain does not distribute the information in the individual repositories to complement each other but duplicates information. The purpose of this approach is distrust in one central authority that could modify the data to its advantage and, at the same time, distrust in the individual participants of the system who could potentially change their instance of the database to their advantage as well. If one participant did this within the blockchain, his behavior would be revealed by information inconsistency with other nodes in the system (Hassan & De Filippi, 2021). The emergence of the blockchain as a distributed database and its use within the DAO itself comes from distrusting central authorities and distrusting other participants in a system or organization who are not restricted in any way when joining the organization. A Decentralized Autonomous Organization utilizes blockchain to store essentially two types of information. The first is membership to the organization represented by a token, which also gives a member the right to vote, a.k.a. co-decide the organization's future direction. This mechanism is analogical to shareholders' rights and voting (Hassan & De Filippi, 2021).

A second key element is a smart contract, a piece of programming code that represents and includes rules of conduct of the organization. These rules may only be established or modified

by a DAO member vote. The rules are applied by a smart-contract program itself so that trust in the organization's leadership is not deemed necessary to carry them out as usual in traditional organizations (Rozas et al., 2021).

As described, distrust is present at several levels of the organization's architecture, originating in the ideological basis of its creators (anarchism and libertarianism) and the trust crisis stemming from the 2008 financial crisis. Authorities' failure within this crisis and their relatively centrally controlled organizations have led to disillusionment, a loss of trust in these authorities, and a search for a systemic solution to overcome the need for trust and the risks arising from the agent-principal relationship (Cunningham, 2016; De Filippi et al., 2020; Rozas et al., 2021).

The topic of trust has been gaining a relatively large space in the field of management research, and its issues are addressed in influential publications, including The Role of Trust in Organizational Settings, An Integrative Model of Organizational Trust: Past, Present, and Future or An Integrative Model Of Organizational Trust (Dirks & Ferrin, 2001; Mayer et al., 1995; Schoorman et al., 2007). The most cited benefits of trust are a positive attitude, increased cooperation, and improved performance (Schoorman et al., 2007). By contrast, there is disagreement across publications on the directness with which trust in an organization affects variables like cooperativeness. Other differing positions of view on trust are seeing it as (1) "being about expectations of future behaviour of another party" (Dirks & Ferrin, 2001) and (2) "being about interpretations of behaviour, the motives underlying those behaviours" (Dirks & Ferrin, 2001), but for this article, analysis is operating with the first view that prevails. Authors even consider the presence of trust in an organization as necessary for certain functions, for example, promoting cooperation (Dirks & Ferrin, 2001).

According to the above, the two areas, DAO and trust research, seem to be in apparent contradiction, as if the DAO consciously sacrifices the benefits associated with trust in favor of the need for less risk in the interaction.

The importance of exploring the relationship between Decentralized Autonomous Organizations and trust is essential to making a conscious decision about what the adoption and use of this concept brings and takes away in terms of the trust. It is also about understanding whether we are on the cusp of a new approach to trust in organizations, ideally before taking this step on a broader scale.

2. Methodology

This is a conceptual paper building new knowledge based on analytically determined resources to answer the following research question: Do DAOs inherently avoid the need for the trust of their participants contrary to the existing theory of trust? Although it is not usual to report the methodology section for contextual papers (Jaakkola, 2020; Hillebrand et al., 2015), the approach is described further to increase trustworthiness, as defined by Lincoln and Guba (1985). The findings are not distilled from data in the ordinary sense but include consolidation of evidence from previously created concepts and empirical studies. This paper follows the type of conceptual research defined as theory adaptation (Jaakkola, 2020). Its purpose is to revise the current understanding of a concept, in this case, Decentralized

Autonomous Organizations. An established theory (trust theory) was utilized to explore new aspects of the DAO concept. The specific trust theory was chosen based on the broadest recognition and citation.

Data collection was based on the results of searching "Decentralized autonomous organization" in the title and abstract of both empirical and non-empirical articles in the Web of Science database. Within these, patterns in the trust theory described by Dirks and Ferrin were identified (Schoorman et al., 2007). As a secondary data source, articles focusing on trust in the context of blockchains were analyzed. All analytical activities were based on content analysis using the MAXQDA tool.

3. Results

3.1. Trust Definition Meets Technology

As mentioned above, the majority definition of trust is formulated as a "psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another" (Dirks & Ferrin, 2001). The definition can be understood that trust cannot be placed in technology because the technology itself has no intentions or beliefs, and thus trust can only be present concerning another person. However, it would be a mistake to avoid the topic of trust in technology to distort the discussion of trust in DAO. Every technology has an author, and believing in technology is to believe in the intentions or behavior of the author (De Filippi et al., 2020). Alternatively, trust in technology is drawn from previous positive experiences using the technology or credibility formed by other people's feedback. In any case, cognitive-based trust is present (De Filippi et al., 2020; McAllister, 1995).

Besides the trustee specification, the last prerequisite for trust analysis in the DAO is the specification of the behavior which can be expected from the trustee. Here it is possible to follow the structure defined by B. Nooteboom (2003), which tells us that trust includes:

1. Trust in the abilities of the trustee,
2. Trust in his intentions,
   a) The belief that he performs as best he can,
   b) The belief that he will not abuse the trust to his advantage.

The design of DAO organizations is primarily motivated by skepticism that the trusted person may abuse his/her position (2b), which manifests in organizations as behaviors involving deception, theft, or lying. The source of the distrust that motivated the creation of the DAO concept is the crisis of trust resulting from the global economic crisis of 2008, where this behavior and failure of authorities led to disillusion (De Filippi et al., 2020; Meijer & Ubacht, 2018).

3.2. Trust Evolution in DAO at Various Organizational Levels

Although Decentralized Autonomous Organizations and their mechanisms are branded as zero-trust, trust-free, or trustless, it would be a mistake to assume that one can do without trust fully to function in this organization, involving cooperation and transactions. The DAO

requires less trust from its members at various levels, as discussed in later chapters, and therefore the adjective less trust-intensive seems more appropriate (Pazaitis et al., 2017).

The need for trust in mediator roles associated with traditional organizations is replaced by blockchain, but the question of what gives us confidence in the blockchain itself remains. We cannot have confidence in an organization and its order if we do not have confidence in its building blocks, the underlying infrastructure. Specifically, we should consider the high rate of successful attacks on blockchains, for example, the attack on the first DAO (called The DAO), which damaged its participants and declined its confidence (Liu et al., 2021). The confidence in the underlying blockchain infrastructure of the company comes from trust in the authors of this technology, the architects, designers, and others who designed and implemented it (De Filippi et al., 2020). As mentioned above, trust here is a belief in their abilities, performance, and especially goodwill (Nooteboom, 2003). That is why among other things, trust is still a part of the very core of Decentralized Autonomous Organizations.

The finding that even in the case of DAOs that proclaim to be trust-free, they cannot function without the presence of trust is confirmation that, to some extent, there is still consistency between this concept and existing research on trust stating that "trust is a necessary condition for cooperation" (Dirks & Ferrin, 2001).

One of the DAO characteristics is that it does not separate members, leaders, and owners, so it is appropriate to examine all three levels for analysis purposes. The attempt to replace trust, which is present in traditional organizations, occurs at several of these levels. The most significant shift in trust between the traditional organization and the DAO is at the leadership level. The cause is the above-referred crisis of trust in authorities that happened fourteen years ago. In a traditional organization, leadership roles represent mediators, according to the agency theory agents, who carry out the will of the shareholders, in the agent theory called principals. The DAO concept proposes eliminating the risks of the agent-principal relationship and the associated required trust by eliminating leadership, the extinction of the relationship, and its replacement by technologies (Liu et al., 2021). The agency problem concerning agency theory, which is resolved by replacing agents with technology, is the most strongly emphasized link between DAO and management science. The agency problem in organizations has its cause in separating ownership from principals who need agents to execute their tasks, which establishes the need for trust and/or control (Liu et al., 2021). Dealing with the riskiness of the principal-agent relationship is nothing new in management and has been the subject of many publications, so the DAO is not unique in this respect (Shleifer & Vishny, 1997).

The distrust in the leadership of the company itself has several components. The first is a distrust in making the right decisions about the direction of the company and the changes that will result. Here, trust in leadership is substituted in the mechanism of voting provided by blockchain and tokens of membership, which allow the majority of DAO members, the token-holders, to make decisions (Hassan & De Filippi, 2021). The voting mechanism permeates the entire organization through organizational processes because this voting system drives all its decisions. However, this presupposes confidence in the wisdom of the crowd principle and trust in the majority replacing the central authority. This is where

sufficient arguments that the mass is less manipulable or independent are missing (Mostagir et al., 2019; Vander Schee, 2009). Again, then, we find that the presence of trust in a DAO (at least according to original DAO concepts) is unavoidable, although it has transformed from trust to leadership to trust to deciding majority.

In the case of DAO votes, a related vessel to decision-making is the sharing of proposals for DAO changes that are the subject of those votes. Creating proposals is the right of every DAO member and part of the mechanism (Rikken et al., 2019). Coming up with proposals is one of the ways of sharing information within the organization, and at the same time, according to trust theory, it is risky behavior that requires trust in other members of the organization (Mayer et al., 1995). Another layer of linkage between the DAO is the presence of trust and trust theory in the organization.

The next component of the distrust in leadership is (not)believing that the agreed rules will be followed because, in the traditional organization, the leadership is not only the rule maker and rule enforcer. In the case of DAO, smart contracts secure rule execution. This need for trust in leadership disappears and is replaced only by confidence in technology (Liu et al., 2021).

At the same time, it should be noted that doubts have been raised as to whether a decentralized architecture paradoxically ensures that power will naturally concentrate on a few individuals who will gradually come to resemble entities similar to central authorities (De Filippi, 2019).

Organizational rules of behavior, including the interaction between its members, are governed by the algorithm implemented in smart contracts, which aims to eliminate the need for trust between colleagues. It successfully does so in smart contract code-covered agendas (Liu et al., 2021). The mechanism protects members only to the extent of the activities described in this algorithm, and questions arise as to how deep smart contracts can go with their potential (Beck et al., 2018). The literature speaks similarly about blockchain's impact on colleagues' trust: "As long as people trust the underlying technological infrastructure, it is possible for them to engage in peer-to-peer transactions. But when it comes to more complex social relationships involving sharing resources and assets, blockchain technology alone does not suffice for people to develop trusted interactions" (Pazaitis et al., 2017). Therefore, additional technology layers are emerging on top of the original blockchain and smart-contract functions to reduce the riskiness of interacting with other organization members and to increase what the literature calls cognition-based trust, i.e., belief in colleague credibility (McAllister, 1995; Pazaitis et al., 2017).

This type of trust in colleagues is not necessarily based on one's own experience with that colleague but also on the experiences of others, which are attached to the colleague's account in the form of a record of historical activity and a rating of his/her other contributions, which together form a digital reputation that naturally influences the level of trust in that person (Pazaitis et al., 2017). Interestingly, unlike the original DAO mechanisms, this newer reputation mechanism does not aim to exercise trust or the need for it but to provide the organization members with the information to make their own decisions about trust or distrust, and it does not make these decisions for them.

Experience with the DAO infrastructure tells us that this system, against expectations, tends towards a "considerably centralized and hierarchical way, with only a few core developers having the power to decide which contributions will be accepted or rejected" (De Filippi et al., 2020; Dirks & Ferrin, 2001). It makes itself no different from traditional organizations, and the need for member trust to run the company persists in maintaining satisfactory efficiency, as suggested by the theory of trust.

One of the specific roles in any organization is infrastructure administrator. The term trust-free associated with blockchain suggests that unlike in organizations where central administrators control the infrastructure, there is no need for trust in the case of this decentralized database. Nevertheless, the truth remains that operating in a Decentralized Autonomous Organization requires trust in the roles of validators and miners to not collude in promoting their own interests and coordinately change the records in their favor. The difference from a traditional organization is only partially reduced risk, but the need for trust directed towards validators and miners is maintained (De Filippi et al., 2020).

Organizational trust theories pay attention to how managers should work with trust in their subordinates to be able to perform control activities. This level of relationship and the associated trust in DAOs disappear with the disappearance of managerial roles, and the control function of managers is replaced by control technologies that do not work with trust (Liu et al., 2021; McAllister, 1995). At the managerial or other levels, the DAO does not address trust as a (managerial) intervention and thus does not reflect its positive effects on process functioning and performance reported in the literature (Dirks & Ferrin, 2001). According to trust theory, the idea of the complete elimination of agents in the form of managers and the significant associated reduction in the presence of trust in the organization would potentially lead to a relatively lower performance of that company (Mayer et al., 1995). In some cases, attempts to extend the original DAO design occur and, in some form, include a subset of managers (and thereby implicitly accept a greater presence or even need for trust) to ensure greater organizational functionality. It suggests that the experience with DAOs is consistent with the theory of trust in the organization (Beck et al., 2018; Chen & Cho, 2021). Thus, in the standard form of Decentralized Autonomous Organizations, trust at the management level disappears, but perhaps only temporarily.

3.3. Trust Beyond DAOs Boundaries

Applying the premise of distrusting the participants in the design of an organization and shifting the need for trust in the organization's participants to confiding the technology may lead to the desired effect only in the areas directly covered by DAO rules because, in areas not covered by the algorithm, the protection of the technology is lost. DAO participants depend on blockchain and smart contracts' protection and risk mitigation. However, rules included in smart contracts are gradually evolving with the organization's development. They can never cover all possible interactions between members, and therefore its participants may find themselves beyond the edge of those rules, exposed by their dependence on DAOs that do not protect them there from the risks at that moment (Hassan & De Filippi, 2021). The mechanism causes that in all situations governed by smart contracts,

when a member interacts with other DAO actors, s/he puts her/himself in greater insecurity. It is because s/he has had a more limited chance to practice trust with them and build up an experience that would indicate their pattern of behavior and the degree of riskiness of trusting them. In other words, the DAO gives less opportunity to build cognition-based trust. At the same time, it cannot entirely remove members of the organization from situations when they interact with others outside the reach of the algorithm and reinforce the need to trust. This combination may ultimately put members at greater risk, directly opposing the DAO's purpose (McAllister, 1995).

As with using technology to store information, such as mobile phones, when we externalize the memory function, we may face new pitfalls in DAOs when the technology we depend on is not available. Then, the relevance and appropriateness of DAOs, when we externalize trust, may also be analogous, and leaning on the weighting of the benefits in areas covered by DAOs against new pitfalls in places not covered by DAOs. The goal of developing Decentralized Autonomous Organizations will be to reach a state where its blockchain and smart contracts are so advanced that they cover most situations and member interactions so that the remaining ones where members will be debilitated are minor and marginal (Wilmer et al., 2017).

The above findings can be condensed into the following coherent answer to the research question. Although DAO concepts attempt to eliminate the need for trust, especially in the early forms, they are only successful to a minimal extent. On the contrary, we find the need for the presence of trust of its participants at many levels of the DAO. Moreover, further development of this concept will lead to a greater need for the use of trust in the organization if it is directed toward commercial exploitation. Thus, decentralized organizations do not represent a phenomenon that denies the conclusions of trust theory.

4. Discussion

Recent research suggests a growing fad for patterns that make DAO organizations operate more effectively and, with it, a concurrent need for trust. These findings emerge, for example, from observations of The MakerDAO, Compound, and others (Sun, 2021; Fritsch et al., 2022). The patterns include, for example, representative proxy decision-making, coalition building, and differing levels of vote power (Zhao et al., 2022; Sun et al., 2022). Thus, we increasingly see the need for trust in actual cases. Gradually, the transferability of traditional mechanisms does not only apply to trust but also, for example, to corporate governance, and others are becoming apparent (Sun et al., 2022).

From the existing signs, using DAOs may be unsuitable for business entities in a competitive environment where you accept trust risks as part of efficiency. To overcome these limitations, we can expect that further development of DAOs will go towards traditional organizations. A suitable hybrid model that adopts some conventional elements, for example, delegation, will be sought.

Implications of the paper are directed both to DAO participants and creators. First, participants should be aware that the concept of Decentralized Autonomous Organizations still inherently requires trust and participation includes risks. Second, even though there is

an apparent attempt by DAO creators and supporters to make a stand against traditional organizations, DAOs share with them more similarities than it may seem, and their further development is bringing these worlds closer. For further DAO progress, it is beneficial to study traditional organizations' practices and occasionally get inspired (Saito & Rose, 2023). It may be necessary, especially when an organization wants to be more efficient and participate in a competitive environment (Zhao et al., 2022).

Even though numbers are not a standard condition of a conceptual paper, the absence of a quantitative dimension represents a limitation to the generalizability, and the ambition is reduced to extending the theory of the DAO phenomenon (Gilson & Goldberg, 2015; Sutton & Staw, 1995).

The assumption of unnecessary trust in the DAO may present risks and potential for abuse, the exploration of which is potentially not only academically but also socially beneficial. It is, therefore, recommended.

5. Conclusions

Although the concept of Autonomous Decentralized Organizations is repeatedly referred to as an organizational governance mechanism that does not require the presence of trust, this is certainly not the case, and DAOs at various levels require the presence of trust. DAOs build on management theories, including agency theory, which is aware of the riskiness of interpersonal relationships and the appropriateness of implementing control mechanisms. DAOs take this view further and seek to eliminate risk without necessary trust (Schoorman et al., 2007). However, existing versions of the DAO have failed in this aim to date and achieved only a partial reduction of the need for trust (Rikken et al., 2019).

The analysis of the relationship between DAO and trust is of great importance because it allows us to consciously decide whether to follow the DAO model for a particular company and thus deprive ourselves of many of the benefits of trust and consider the meaningfulness of this option. Although trust freedom is presented as a virtue of this organizational design, it comes with a cost that arises from trust theory.

It is essential to put new management trends and approaches into the context of existing theories to realize whether we are reinventing the wheel unnecessarily and what consequences the implementation of these trends may have. Looking back at existing theories, we can predict the further development of the DAO concept. It can be assumed that the concept will increasingly consider the outcomes of trust theory so that firms using this concept can be (more) competitive and can enter standard market environments where they have not been so much present so far. Moreover, we already see signs of this direction (Beck et al., 2018). Therefore, even after the advent of the DAO concept, we cannot say that there are organizations worldwide that can fully do without trust in another person.

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