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Creating Trust in Citizen Participation through Decentralized Autonomous Citizen Participation Organizations (DACPOs)

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ABSTRACT

Blockchain-based Decentralized Autonomous Organizations (DAOs) are systems for transacting and storing value by automatically executing a function without the need for trusted, centralized authorities. Participative budgeting requires voting about budget allocation by communities and is often confronted with issues in trust and transparency. Yet, DAOs are hardly used for participative budgeting. In this research, we introduce Decentralized Autonomous Citizen Participation Organizations (DACPOs). In a DACPO, data and actions are recorded and autonomously executed in a decentralized way. DACPOs can be used for enabling participative budgeting and thereby provide transparency, decrease the risks of fraud and corruption, and increase citizens' trust. The viability of DACPOs depends on a number of factors, including a minimum number of citizens who participate. In further research, factors influencing the use of DACPOs for participative budgeting can be further analyzed and tested.

KEYWORDS

Blockchain, Decentralized autonomous organization (DAO), Decentralized autonomous citizen participation organization (DACPO), Participative budgeting, Token smart contract

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1 INTRODUCTION

Since the rise of the first blockchain-based application of Bitcoin and smart contracts, numerous new possibilities for decentralized applications have emerged [1]. As shown in the figure below, over the past few years, there has been an exponential growth in Decentralized Autonomous Organization (DAO) applications and projects on various blockchains. DAOs are systems for transacting and storing value using voting or notary functions without the need for central authorities. Data and actions are recorded and autonomously executed in a decentralized way [2].

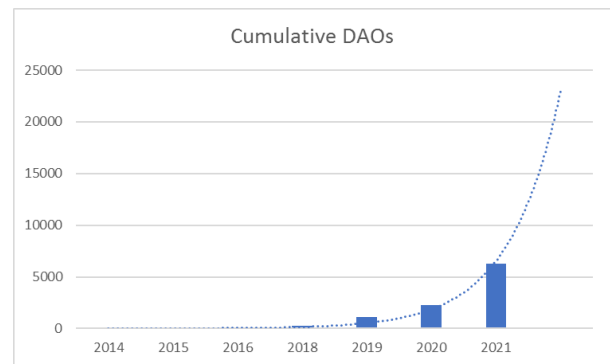


Figure 1: Cumulative amount of DAOs 2014-2021 - Rikken, Janssen, Kwee 2022

Since the end of the 1980s, participative budgeting initiatives have emerged from Latin America to Europe [3]. Challenges faced by these initiatives include challenge of empowerment of participative governance, threat of losing autonomy by institutionalization, information asymmetry and control loss, and lack of personal characteristics [3-5]. These issues can be resolved by using DAO applications to create transparency, decrease information asymmetry, and execute autonomously based on predefined logic. Through code in smart contracts, DAO applications can help to resolve issues of losing autonomy and control loss by citizens. The ideas of DAO using for participative budgeting results in a new organizational form which we label *Decentralized Autonomous Citizen Participation Organization* (DACPO).

DACPO applications can be very suitable for increasing citizen participation and enhancing trust. In DACPOs, there is joint control

over the storage and transaction of value and voting. Voting results are autonomously monitored and executed. In this way, participants have direct control over the budget without any need for government involvement or other parties. Hence, fair decision execution is warranted.

2 INCREASING CITIZEN PARTICIPATION THROUGH DACPOS

Our research aims to increase citizens’ participation by designing a DACPO and its governance. A schematic overview of how such a DACPO works is displayed below. At the top, the citizens are shown, whereas the bottom shows the automatic execution of approved budget allocation.

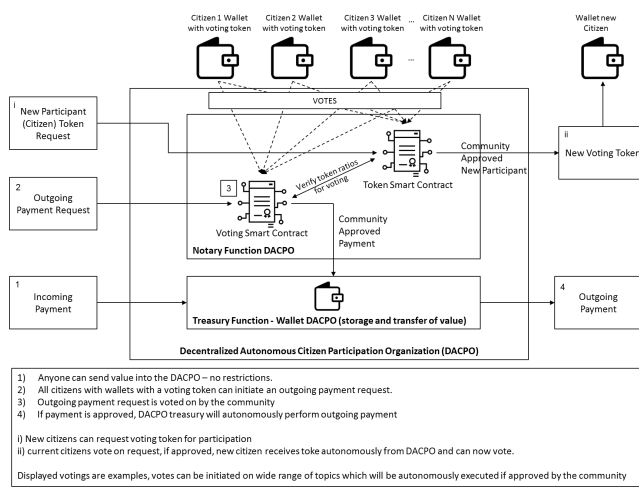


Figure 2: Schematic overview of possible processes DACPO

3 RESULTS, CHALLENGES AND BENEFITS OF DACPOS

Our research shows a correlation between the number of participants and long-term viability of DAOs. Using a survival analysis through ROC curve, we found that DAOs with more than 20 participants seem to have a longer activity level than DAOs with less than 20 participants [2]. Furthermore, our research demonstrates that DAOs without a direct or indirect incentive for participation (e.g., increased value of a token), are more likely to show long-term viability than DAOs with incentives. We expect something similar for DACPOs, that a minimum number of participants is needed to increase the likelihood of long-term viability, and that the participants need to be motivated intrinsically.

The long-term viability of participation seems to be dependent on a combination of the functional characteristics of managing community funds and community voting. Such a combination further enables the democratization of the budgetary participation process, including the execution of the outcome of the voting. Hence, DACPOs fundamentally facilitate participatory communities as they seem to solve some of the challenges, such as trust and transparency, as identified in participatory budgeting research [3-5]. The benefits of DACPOs, derived from benefits in other DAO areas, related to the challenges in participatory communities are displayed below.

Additionally, our current research empirically investigates the relations between the number of participations and long-term viability. One step further is to test this empirically by investigating various forms of governance mechanisms and the DAO goal in relation to the governance mechanisms.

4 CONCLUSION AND FURTHER RESEARCH

DACPOs can create trust in participatory budgeting initiatives to ensure long-term viability. DACPO applications appear to be very suitable for increasing citizen participation. Challenges like control, personal characteristics through true direct participation, and information asymmetry in decision-making can be addressed

Table 1: Potential Benefits DACPOs related to participatory community challenges

Participatory Community Challenge	DACPO Characteristic Solving Challenge	Resulting Benefit of DACPO
Information asymmetry	Transparency and smart contracts	As DACPOs are built on decentralized infrastructure, all information regarding voting is transparent for all participants as specified in the “business rules” for voting and tokens in the smart contract.
Lack of empowerment	Direct voting	Due to direct voting capability of all participants in DACPOs, all participants stay empowered in all decisions, including budget spending.
Losing autonomy and control	Direct voting and autonomous execution through smart contracts	Due to direct voting through blockchain-based smart contracts, the outcome of votings is executed autonomously and not prone to centralized bureaucracy for execution. Also, the immutable characteristic of functions (rules) in smart contracts helps to improve the feeling of control (i.e., no one can single handily alter the rules).
Lack of personal characteristics	Direct voting and transparency	All participants have direct control and equal information, thereby creating a better sense of ownership and thus adding to a more personal characteristic.

by using DACPOs. Although DACPOs can enhance trust, further research is needed on how they can be realized in practice. In further research, factors influencing the use of DACPOs for participative budgeting can be investigated.

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