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INCLUSIVITY AND SCIENCE ORIENTATION OF DAO: PROBLEMS AND PROSPECTS

Purpose of the research. Exploration of the research gaps in order to understand how DAOs can encourage initiatives/practices to protect the interests of various stakeholders as well as identifying and comparing the main problems and prospects for creating and scaling DAOs in the existing economic realities. The following hypotheses that DAO is a form of science-oriented entrepreneurship and creates opportunities for involving unused entities in diverse economic processes were analyzed.

Methods of the research. The formation and justification of the theoretical basis of the research are carried out through a review of current literature sources. The hypothesis testing, measuring the advantages and disadvantages of DAO were implemented by combining qualitative analysis (structuring, benchmarking, identifying weaknesses and strengths) and quantitative analysis (three-dimensional matrix: structural blocks, advantages/disadvantages, criteria for inclusivity/ science orientation). The advantages and disadvantages of the DAO were divided into structural blocks: leadership, team, management, and external challenges.

Results. Tokens are the most universal equivalent of both ownership and rights, as well as work performed for DAO. Decision-making is carried out on the basis of token ownership. Depending on the flexibility, the rights of token holders may be predetermined or provided for the possibility of making changes. Depending on the direction of activity of the DAO, tokens give grounds to invest, manage, create and promote. The material availability of the token (earn or buy) affects the degree of coverage of potential stakeholders of the DAO project (the level of inclusivity). The technical availability of the token is related to the concept of science-oriented entrepreneurship (the level of technical skills and knowledge that must be possessed to attract DAO to its activities). Inclusivity is more often reflected in the advantages of the DAO. The very principles of functioning and management of the DAO imply a high level of engagement, as well as the most equal opportunities for blockchain technology enthusiasts. The development of the research and competence component in entrepreneurship is particularly relevant for the implementation and use of DAO projects. Science orientation is mainly associated with the priority of professional and technical skills for interaction with the external ecosystem (universities, consulting agencies, technology companies).

Practical value/originality. The algorithm for creating and functioning DAO is based on the principle of inclusivity. Such advantages of the DAO as lack of hierarchy, earned leadership, responsibility for the work done, collective decision-making, transparency of management ensure maximum involvement of motivated participants and fair development opportunities. The criterion

of science orientation is mainly revealed in the disadvantages of the DAO. There are potential restrictions on scaling DAO projects precisely at the level of professional and technical skills of participants. The active implementation of DAO in business activities is associated with the risks of insufficient skills and knowledge of interested parties.

Keywords: blockchain, tokens, cryptocurrency, decision-making, decentralized management, inclusivity, science-oriented entrepreneurship.

Introduction

The traditional interests of CEOs/agencies that protect computer management tools need a new perspective to cope with the new wave of digital transformation. Decentralized Autonomous Organizations (DAOs) promise ideal solutions for proven assets/resources, a value shared ownership, and practice reaching consensus to vote on an immutable transparent ledger. Currently, there is a small amount of research that allows combining traditional computer management measures using any structure to implement decentralized digital transformation. A systematic view of corporate governance measures is needed to explore research gaps in order to understand how DAOs can encourage initiatives/practices to protect the interests of various stakeholders. It is important to understand how feasible these projects are, what conditions are necessary for this (science orientation), how highly motivated the key participants are, and what are their opportunities for initiation in DAO projects (inclusivity). Identifying and comparing the main problems and prospects for creating and scaling DAO in the existing economic realities is an urgent practical problem for research.

Hypotheses

As part of the study of the possibilities and limitations of the DAO, the following hypotheses were put forward and analyzed:

Hypothesis 1. DAO is a form of science-oriented entrepreneurship.

Hypothesis 2. DAO creates opportunities for involving unused entities in diverse economic processes.

Research methods

The following methods were used to test the objectivity of the hypotheses:

1) The formation and justification of the theoretical basis of the research is carried out through a review of current literature sources, as well as using universal methods of comparison, generalization, systematization, classification, content analysis.

2) The hypothesis testing, measuring the advantages and disadvantages of DAO were implemented by combining qualitative analysis (structuring, benchmarking, identifying weaknesses and strengths) and quantitative analysis (three-dimensional matrix: structural blocks, advantages/disadvantages, criteria for inclusivity/science orientation). The advantages and disadvantages of the DAO were divided into structural blocks: leadership, team, management, and external challenges. For each advantage/disadvantage, the dominant criterion (inclusivity, science orientation) was determined and theoretically justified. Based on the results obtained, a three-dimensional matrix is compiled that reflects the number of qualitative parameters of the DAO that meet the aspects of the criteria (inclusivity/science orientation), measurement (advantages/disadvantages), direction (leadership/team/management/external challenges).

Literature review

Decentralized Autonomous Organizations (DAOs) are a relatively new type of online organizations linked by specific business models. All members of the DAO work together and participate in decision-making processes in a decentralized, collective, and fair manner. In the DAO, participants' interaction is mediated by blockchain-based software agents who encode the management of a particular organization in terms of rules that optimize their business and goals. DAO software platforms provide decision-making

models designed to facilitate digital management and collaboration between their participants, intertwining social and economic challenges. [1] The DAO belongs to the participants but does not have a hierarchical leader. Instead, the group's founding members agree on interaction rules encoded in blockchain technology using smart contracts. These smart contracts do not change, and since they are part of the blockchain, everything is publicly recorded. [2] The general scheme of the DAO's work, which reflects the essence of this type of organization, is shown in Figure.
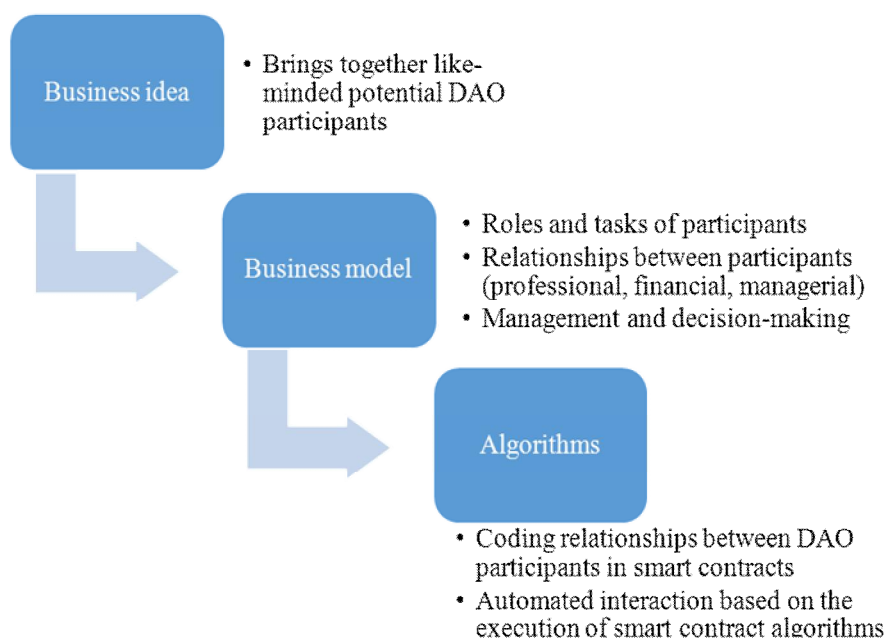
Essence of DAO

Source: developed by the author.

Thus, DAOs are organizations that de facto exist in the blockchain system, and carry out their activities on the basis of public algorithm codes presented in the smart contract system. Once a smart contract is launched, no one can change the rules without a vote. If someone tries to do something that is not provided by the rules and logic of the code, they will fail. Money management is also defined by a smart contract. This means that no one can spend money without community recognition. Decisions are made collectively, and payments are automatically authorized during voting. This is possible because once launched, smart contracts are protected from unauthorized access. Nobody can edit the code (DAO rules) secretly, because everything is public. If compare the DAO with how large companies like Apple, Google or Netflix work, these companies have a Board of directors that makes certain strategic decisions by voting on specific points. The company's operating rules and strategic goals are set. [3] The result is a list of necessary actions and tasks that the contractor (the company's executive director) is responsible for. The main differences between DAO and traditional organizations are presented in more detail in Table 1.

So, based on the results of a comparative analysis of DAO and traditional organization, we can say that the DAO makes it possible to minimize the prerequisites for manipulation, individual decision-making, and work in individual interests. This makes DAO truly decentralized. [4] And the decentralization of management is implemented based on interaction automation.

Next, we will define the circle of main parties involved in DAO, as well as their interests, roles, and tasks.

1) Founders are those who propose the DAO in a founding document called "DAO technical document". In practice, DAOs are launched by a group of founders who present the initial goals and rules to other cryptocurrency investors in a "technical document" published on social networks. The goal of the founders is to promote the business idea and attract investment. The technical document provides investors

with basic technical, organizational, and investment information about the DAO. As a rule, DAO technical documents suggest ways to solve certain problems through the cooperation of a P2P network community. The founders of the DAO define the rules of management and functioning, but they are applied by machines.

Table 1

Comparative analysis of DAO and traditional organization

Comparison criteria	DAO	Traditional organization
Hierarchy	Usually without hierarchy.	Usually hierarchical.
Change policy	A vote is required to make any changes.	Depending on the structure, changes may be requested by one party or proposed by vote.
Voting	Votes are counted, and the result is implemented automatically without a trusted intermediary.	Votes are counted using an internal procedure, voting results must be processed manually.
Making decisions	The services offered are processed automatically in a decentralized manner (for example, the distribution of charitable funds).	Human intervention or centrally managed automation is required. Tendency to manipulation.
Transparency	All activities are transparent and fully accessible to the public.	Usually, the activity is confidential, and public access to information about it is limited.

Source: developed by the author.

2) Investors are cryptocurrency owners who invest in DAO and become its members. When they invest cryptocurrencies in DAO, they receive DAO tokens as a means of accessing specified functions (such as voting, sharing, change proposals) within the DAO. Investors become project participants when they vote and approve technical documents, as well as work to develop the goals of DAO through various measures and new proposals.

3) Developers contribute by creating, implementing and developing the rules of the DAO technical documentation in a smart contract encoded using the blockchain protocol. They also encode future changes and new agreements.

4) Miners put their computers at the disposal of the blockchain infrastructure to verify and validate the exchange of cryptocurrencies, as well as to verify and record the interactions of DAO participants within the organization, such as buying, selling, and exchanging tokens, voting on proposals. Miners use their computers to create distributed registries that record all interactions. [5]

Each of the participants is involved in the activities of the DAO in different ways, depending on the "pass ticket" to membership in the organization. Forms of DAO membership:

1) Token-based membership. Joining takes place as a result of trading DAO tokens on a decentralized exchange. Participants buy (receive) tokens that permit to participate in the activities of the DAO and access to voting. [6] An example is MakerDAO. The MKR token is widely available on a decentralized exchange, and anyone can buy the right to vote.

2) Equity participation. Such DAOs are more focused on permits with proof of rights. Potential members can submit an offer to join the DAO. They usually offer tokens or work for this. Shares exercise the right of direct voting and confirmation of ownership. Members can leave at any time and take their share of the property with them. [7] For example, MolochDAO focuses on financing Ethereum projects. They require to submit a membership offer so that the group can assess whether the potential participant

has the necessary experience and capital to make informed decisions about potential grant recipients. Nobody can just buy access to a DAO on the open market.

3) Reputation-based membership. DAO based on reputation does not transfer ownership rights to participants. Reputation is proof of participation and gives the right to vote in the DAO. Reputation cannot be bought, transferred, or delegated. [8] DAO members must earn a reputation through participation. Potential members are free to submit applications to join the DAO and fulfill requests for reputation and tokens as a reward in exchange for their contribution. For example, DXdao is a global independent team that has been creating and managing decentralized protocols and applications since 2019. It uses reputation-based management and holographic consensus to coordinate and manage funds. This means that no one can buy the right to influence their future.

Thus, DAO participants can connect to the organization both on the basis of tangible assets and an intangible contribution. Joining the DAO can be either free (purchasing tokens on a decentralized exchange) or limited (earning tokens through work). As a result, the key stakeholders of the DAO go through various paths - from acquisition to active attraction. At the same time, the most optimal way to attract founders and investors is through a share or tokens, and for miners and developers - through tokens and reputation. Thus, tokens are the most universal equivalent of both ownership and rights, as well as work performed. At each stage of launching the DAO, certain stakeholders play a priority role. [9] This depends on how relevant the functionality of each of the participants becomes. Let's take a closer look at the stages of launching a DAO, identifying the key stakeholders of each stage (see Table 2).

Table 2

Stages of DAO launch

Launch stage	Key stakeholders	Stakeholder functions
Creation of the smart contract	Founders	Development of DAO rules and business model
	Developers	Creating a smart contract on which the DAO will be built
Financing	Miners	Organization of access to sources of funding and ways to activate management
	Investors	Purchase of tokens in exchange for voting rights
Deploy in the blockchain	Developers	Uploading a smart contract to the blockchain, activating the management system

Source: developed by the author.

At the stage of creating a smart contract, developers need to be careful not to make mistakes that can lead to security holes. At the financing stage, it is important to understand the most optimal ways to attract the required amount of assets (decentralized or centralized platforms). When uploading to the blockchain, the main task is to ensure maximum simplicity and efficiency of management. After launching, issues related to the functioning of the company are based on management approaches, main areas of work, decision-making methods, and forms of remuneration. According to these criteria, a classification of DAO types is formed:

1) By decision-making methods:

− Direct democracy. Any DAO member proposes projects, and decisions are made by universal suffrage.

− Representative democracy. The community selects representatives who are responsible for making operational decisions. This allows to make decisions faster and more efficiently. Users still have the opportunity to veto any decisions, and at any time withdraw a representative in case of unsatisfactory work. [10]

2) By degree of flexibility:

– Administrative DAO. A certain group of people (most often the team of the main developers of the project) has already created the rules of the game and the community adapts to them, getting certain opportunities.

– Descriptive DAO. Allows the community to create the criteria by which this community will function [11].

3) By area of activity:

– Investors. These are funds that make decisions with the help of the DAO. This community, which has decided to raise a certain amount of funds in the pool, registers and invests in projects. Shares and profit sharing are made using smart contracts, and decisions are made by voting. Example: Metacartel, the LAO, Stacker Ventires, Syndicate.

– Protocols. These are projects that usually issue their tokens after the protocol is launched and distribute them to users. Autonomous communities in such protocols do not decide 100 % of what happens inside, but they have a number of areas where they can affect the operation of the protocol. Example: Compund, Uniswap, Aave или Yearn Finance.

– Projects. By holding the DAO token, the participant gets the right to profit from the protocol and the right to participate in protocol decisions. Project DAOs create products that make a profit. Example: Index Coop, Pie DAO, Badger DAO, Yam Finance.

– Curators. Aimed at NFT and other Crypto Art, invest in them. Example: Flamingo, Gremlins, B2DAO, Whales, Metafactory.

– Community. Unite around one idea and work on it. Example: PleaserDAO, Meta Gamma Delta. [12]

4) By reward models:

– Work to Earn (W2E). Participants can work to earn money and generate either their own tokens or fiat currency denominated in US dollars, a digital currency pegged to the US dollar.

– Play to Earn (P2E). Players own their characters or peripheral assets, such as swords, players own their assets in the form of NFT (non-reciprocal tokens) and can sell them on the game market.

– Learn to Earn (L2E). DAO platforms pay for learning apps Web 3.

– Create to Earn (C2E). Participants create something to earn money, such as writing articles or creating illustrations in exchange for tokens.

– Use to Earn (U2E). Participants use various products to earn money. For example, they post comments and interact with social media apps Web 3 [13].

4) By management types:

– Delegation. Token holders delegate votes to users who nominate their candidates and are required to follow the protocol.

– Automatic control. Transactions are automatically confirmed if the quorum of participants voted in the affirmative. Exceptions are cases when the founders of the DAO impose a veto.

– Multi-signature management. Despite the fact that the DAO may have several thousand voting members, funds can be managed by 5-20 active community members. These participants are trusted, and usually their data is made publicly available. Their personalities are known to the community. After voting, the owners of multi-signatures fulfill the will of the community [14].

According to the data provided, decision-making is carried out on the basis of token ownership. The difference is whether all token holders participate in making operational decisions. Depending on the flexibility, the rights of token holders may be predetermined or provided for the possibility of making changes. Depending on the direction of activity of the DAO, tokens give grounds to invest, manage, create and promote. The reward model defines the key ways to receive tokens - work, play, learn, create, and use. In the classification of the DAO by management types, tokens are responsible for how proposals are made, how voting is organized, and how its results are implemented. Thus, the key element of the DAO business

model is the token. It is the token that is the subject of investor interest and reflects the business idea of the founders, encoded by developers in smart contracts. The material availability of the token (earn or buy) affects the degree of coverage of potential stakeholders of the DAO project (the level of inclusivity). The technical availability of the token is related to the concept of science-oriented entrepreneurship (the level of technical skills and knowledge that must be possessed in order to attract DAO to its activities).

In more detail, the concept of inclusivity and science-oriented entrepreneurship in the context of positive and negative aspects of the DAO will be discussed in the next section of the study.

Results

To analyze the essence of the DAO, possible problems and prospects for implementing these innovations, we will define the criteria:

1) Inclusivity for business – provides for taking into account the interests of the maximum possible number of interested parties, as well as ensuring equal opportunities for economic entities to carry out professional and entrepreneurial activities [15].

2) Science-oriented entrepreneurship. In recent decades, scientific and practical developments have paid considerable attention to the issue of knowledge creation and its impact on productivity. Applying the principles of open innovation and effective knowledge management allows progressive enterprises to improve not only their products but also internal business processes. In this regard, the role of intellectual labor workers in companies is growing rapidly. At the same time, innovation activities are closely related to research activities. A potential problem is that traditionally research is conducted only by the academic community, but there is a growing need for research that will be applied to practical situations and business needs. The solution to the problem can be obtained in two ways.

Firstly, on the basis of the formation and strengthening of the University-Business cooperation model, and secondly - on the basis of the formation of an independent research potential of the business, namely, through the development of research functionality or research skills of employees. In some cases, the search for ways to improve business efficiency by strengthening the research component means the scientific orientation of the enterprise.

Let's start by defining the advantages of the DAO, and also analyze how significant the advantage is aimed at increasing business inclusivity, as well as how these advantages are based on the research activities of the enterprise. All advantages are grouped into the following blocks: leadership, team, management, and external challenges.

DAO advantages:

A1. Leadership.

A1.1. No hierarchy of power. In a traditional organization, there is always some kind of hierarchy. In general, the board of directors, managers, and senior management form the basic power structure. Any proposed changes are entirely in the hands of this higher echelon. [16] The DAO seeks to deconstruct this traditional model by simplifying the hierarchy. These organizations rely on the security and transparency of the blockchain to distribute power evenly among all participants. Smart contracts encoded in the blockchain cannot be changed without the consent of the majority, and each change is publicly documented to ensure full compliance. The absence of a hierarchy provides all participants with the opportunity to participate in project management (inclusivity).

A1.2. Equal ownership and a sense of community. In most traditional organizations, it is almost impossible to penetrate the highest echelon of power once it is established. Usually, the same managers and directors remain in power for decades, which does not allow lower-level members to make a significant contribution to the management of the company. [16] Within the framework of the DAO, control over the organization's assets and management is transferred to each participant, depending on their contribution to the project. This means that every person who has contributed capital has an equal voice in managing the organization. In turn, this promotes a sense of community and collaboration, which helps the company achieve its goals faster. Based on private ownership and a sense of community, each highly motivated participant has the opportunity to influence the organization's activities (inclusivity).

A1.3. Leadership is earned. Traditionally, top-down leadership goes to those who either already have power or have the opportunity to acquire it. Since everyone has equal shares in the DAO, power is not "given" to anyone. Instead, it is made by the merits of the proposals made. [16] This creates an organization that follows the instructions that people voluntarily follow. It always produces better results, whether through growth, innovation, or higher profits. This leadership style can be practiced by every good leader. Even if they haven't "earned" their role in a formal way, they can earn the trust and loyalty of their team through their actions. Earned leadership means that the reward is carried out not in proportion to tangible assets, but in proportion to activity, energy and involvement in the project (inclusivity).

A1.4. DAO causes a change in internal leadership. The traditional business structure appoints managers who take control of teams and, as the name suggests, manage people. If one can no longer control others by force, people need to train, influence, and motivate others. [17] This ensures that everyone feels sufficiently informed to make a decision, and mobilizes support for the specific proposal to be voted on. This means that strong leadership skills will be crucial to gaining support and influence in society. Changing the internal guidelines of leadership in the DAO allows everyone who has mental certainty, the ability to generate ideas and solutions, as well as implement them to be involved (inclusivity).

A2. Team.

A2.1. Full transparency. Transparency is a serious problem that traditional organizations are trying to solve. Even well-intentioned companies have to carefully monitor their brand image, which often means missing out on certain information. In addition, businesses that offer a certain level of transparency often do not disclose things like financial conditions and expenses to employees or the public. [18] In the DAO, transparency is directly at the heart of the organization. Blockchain technology is specifically designed to provide an immutable public record of all transactions. This means that people can invest in the DAO with the confidence that their capital is being used wisely. Thanks to transparency, everyone can get acquainted with the public code and make appropriate decisions (inclusivity).

A2.2. Participants can collectively shape the future of the enterprise. This idea is similar to how stocks work in public companies, but it's not a clear comparison. DAO members buy management tokens that are used to vote on proposals. [19] After voting is submitted, these tokens are spent and the votes are published. In this way, members are forced to vote thoughtfully and in a way that best fits the overall direction of the organization. Everyone has their own "coin in the game", and this encourages participants to build a better future. Thanks to collective voting, decisions are made by all in accordance with the protocol code (inclusivity).

A2.3. Employee engagement and responsibility. Attracting employees and creating a sense of responsibility for the project is another important factor in the effectiveness of future work. DAOs achieved this because every DAO member was invested in the organization. [20] It is more important for today's employees to feel that they have the right to vote and a certain interest in the game. Engaging employees in the decision-making process (especially when creating product ideas) and ensuring transparency in the decision-making process is essential to ensure that employees feel included and engaged. The mutual responsibility of DAO participants creates conditions for mutual interest in the project (inclusivity).

A2.4. In the structure of the DAO, the individual contribution is visible and recognized. People who do a great job but are modest and quiet are often not recognized in the traditional company structure, as many of their efforts go unnoticed. [21] In the DAO organization, everything is visible, which means that individual employees are not overlooked, and they receive well-deserved recognition for benefiting all other team members. Understanding the public recognition and significance of the work performed encourages participants to maximize their involvement in the activities of the DAO (inclusivity).

A2.5. Freedom to do more useful work. The technologically oriented nature of the DAO can lead to the automation of elementary algorithmic work, which will allow participants to become the most creative and useful versions of themselves and allow them to spend more time on important activities that stimulate

the state of flow, and less time on monotonous, small tasks. [22] While 85 % of today's global workforce is not employed, the DAO will give people more freedom to choose projects whose mission and vision are truly close to them, jobs that match their strengths, and people who share their values. It can also help mitigate work-life conflicts, excessive workload, lack of autonomy, and office policies that lead to workplace stress. The freedom to perform more useful work provides a flexible placement of accents in accordance with the capabilities and needs of participants and allows to attract the maximum human and intellectual resources (inclusivity).

A3. Management.

A3.1. More flexibility. Modern corporations are like huge ships that take a huge amount of time and effort to change course. [8] Before any real changes can be made, it is necessary to go through endless red tape. In the DAO, changes can be proposed and implemented with relatively little difficulty. Although the TAO is primarily based on the distribution of funds, leaders can still observe how this process works and see how effective it is. The flexibility of the DAO ensures maximum resource utilization through faster development and implementation of necessary changes (inclusivity).

A4. External challenges.

A4.1. There is no need for trust. No one needs to trust the CEO, the manager, or anyone else, because everything is spelled out in a smart contract that is uploaded to the blockchain and everything happens automatically. The lack of trust must be reinforced by technical, managerial and economic competence (science orientation).

A4.2. DAO cannot be closed. In the DAO, the decision to close can only be made by voting in accordance with the DAO rules. [7] And it will be physically difficult to stop the work of an autonomous organization, since smart contracts work independently in the blockchain, which is validated by thousands of nodes around the world. This means that there is a need for a conscious and extremely thoughtful attitude to the activities of the DAO, since erroneous actions are almost impossible to correct or cancel (science orientation).

A4.3. DAO is an open resource. This means that everyone can review the code and even suggest improvements. [14] Usually, an open resource provides more reliability, since a large number of developers can participate in writing and revising code. In addition, suggestions and voting can help solve the identified problems. This indicates a high level of involvement of diverse stakeholders in the activities of the DAO (inclusivity).

A4.4. Quadratic financing. Fundraising from DAO is a common occurrence in the Web3 ecosystem. Startups or organizations are controlled not by a group of people, but by a group that has invested in them and therefore has a say in decision-making. Quadratic funding is a form of democratized fundraising that aims to promote fair and inclusive funding for the benefit of society. [11] The idea is to compare modest individual contributions with large amounts from sponsors or donors. Thanks to the quadratic financing method, most participants get the opportunity to actively participate in the work and management of the DAO, regardless of the financial contribution (inclusivity).

A4.5. Work from anywhere in the world. Netflix co-founder Mark Randolph said on the Future Squared podcast that "in a place where you are judged solely on the quality of your work, no one cares about your appearance". Instead of working year-round in a central office and having two to four weeks off, most DAO participants are more likely to work remotely, chatting in virtual social spaces and gathering in real life for a few days or weeks a year for inspiring conferences. Traditional organizations that require their employees to spend 2-3 days a week in the office tie their employees to living in one place. [16] Companies with such archaic and mobility-constrained positions are likely to have a harder time winning the battle for millennials and Gen Z talent. Thus, the DAO attracts employees regardless of geography and preferences in the form of work (inclusivity).

Now, in the context of inclusivity and science orientation, we will also consider the disadvantages of the DAO in the following blocks: leadership, team, management, external challenges.

D1. Leadership.

D1.1. Distribution of votes in the DAO. Some DAOs use a voting system in which the weight of a vote is determined by the number of tokens delegated to the protocol. This means that any member with a large number of coins can prevail over other members of the community, even if they are in the minority. For example, in MakerDAO, according to the vote and its results in the survey, 4 out of 46 participants had a weight of 58.8 %. [16] This means that the decision will be in their favor, even if other participants voted against it. The approach used in MakerDAO leads to centralized control, which contradicts the essence of Decentralized Autonomous Organizations. At the same time, changing the voting mechanism will not work if the largest token holders in the DAO vote against it. Disproportionate asset allocation in proportional voting limits the involvement and equal opportunities of project participants (inclusivity).

D2. Team.

D2.1. The social aspect of the DAO. Usually, the number of voters is not controlled or limited in any way. Formally, this means that both 10,000 participants and only five can participate in voting. For example, in the latest survey on the well-known MakerDAO platform on blockchain and Ethereum, which issues a decentralized algorithmic stablecoin DAI, less than 50 people took part, most of whom voted for the proposal. [7] Limited objective opportunities for 100 % active voting participants mean the limited inclusive nature of the DAO (inclusivity).

D2.2. The principal-agent dilemma. When an individual or legal entity is able to make decisions or perform actions on behalf of another legal entity or individual, there is a risk of diverging goals, priorities, or access to important information. In the DAO, in order to perform any action related to spending funds, an open and fair vote of participants on the blockchain is necessary. [10] And the distribution itself takes place automatically using smart contracts without human intervention. The role of an agent in blockchains and DAO is based on automated work that does not require control from investors. However, for example, the authority of developers increases as they control the development of software that maintains the relationship between principals and agents. The task for the founders and investors of the DAO is to immerse themselves in the technical component of projects in order to counter possible challenges and contradictions (science orientation).

D3. Management.

D3.1. Complexity and ambiguity of blockchain management. Integrating individual social relationships with economic aspects based on the use of blockchain technology is a very difficult task. The concept is still under development and lacks a general understanding, which makes the adoption and launch of the DAO challenging, and not just because of technological challenges. [8] The continued development of blockchain technology requires a high level of awareness of ongoing processes and constant monitoring of technological changes (science orientation).

D4. External challenges.

D4.1. Lack of decision-making experience. DAO members often lack experience in addressing voting processes in organizations that use blockchain technology, such as managing wallets and signing transactions. In addition, these models lack computational semantics and interaction capabilities that provide a common understanding and knowledge that could support the further development of specific decision-making and evaluation systems in the DAO. [21] Solving issues related to ensuring the fairness of the DAO voting system, as well as developing directions for necessary changes, requires technical skills and knowledge of the key principles of blockchain technology (science orientation).

D4.2. Impermanence and legal uncertainty. The legal status of the DAO has not yet been clarified, so regulators have not yet developed rules for the operation of decentralized platforms in the financial sector. The same goes for the DeFi industry itself. So far, no company can legally interact with the DAO and use these platforms in business transactions, although this is not prohibited. But anyone who enters the DeFi industry will face legal challenges. [22] Few jurisdictions have legalized the DAO. Wyoming, for example, became the first U.S. state to recognize the DAO as a legal entity. Participants may also be located in different jurisdictions. Different countries have different legislation, and some do not even

define the rules by which the DAO should operate. The uncertainty of the legal field of the DAO requires a close study of the legal framework of both national legislation and foreign jurisdictions with whose residents' cooperation is carried out (science orientation).

D4.3. Security aspects. Many DAOs run on fully decentralized blockchains, such as the Ethereum network, Cosmos, Solana, and Cardano. If the protocols are successfully violated, it is impossible to stop attackers and prevent the movement of assets. This means that they can freely withdraw funds from the compromised decentralized protocol pool. An example is the famous incident with the first DAO platform, known as the DAO, in 2016, which led to the division of the Ethereum network and the appearance of the Ethereum Classic hard fork, which later became the main network, while the original network remained in its original form. The DAO was able to raise 1 150 million in ETH coins during its initial coin offering (ICO), making it one of the most successful ICO projects in the history of cryptocurrencies. [16] However, after the hack, the platform ceased its activities, and tokens were withdrawn from major exchanges. The significance of potential damage and the complexity of countering successful hacking requires a high level of competence of developers and miners who support the project (science orientation).

The data of the conducted qualitative analysis is transformed into a quantitative format based on the three-dimensional matrix presented in Table 3.

Table 3

**Matrix of results of analysis of the essence of DAO in the context
of criteria of inclusivity and science orientation**

Criteria Blocks	Inclusivity	Science orientation
1. LEADERSHIP		
Advantages	4	0
Disadvantages	1	0
2. TEAM		
Advantages	5	0
Disadvantages	1	1
3. MANAGEMENT		
Advantages	1	0
Disadvantages	0	1
4. EXTERNAL CHALLENGES		
Advantages	3	2
Disadvantages	0	3

Source: developed by the author.

As can be seen from Table 3, inclusivity is more often reflected in the advantages of the DAO. This means that the very principles of functioning and management of the DAO imply a high level of engagement, as well as the most equal opportunities for blockchain technology enthusiasts. The fact that inclusivity is inherent in the DAO is also confirmed by the fact that most of the positive aspects of projects relate to the internal environment of organizations (leadership, team, management). Also, the quantitative interpretation of the conducted qualitative structural and block analysis shows that the criterion of science orientation is mainly associated with the disadvantages of the DAO. This suggests that the development of the research and competence component in entrepreneurship is particularly relevant for the implementation and use of DAO projects. At the same time, the fact that science orientation is mainly associated with the "external challenges" block indicates the priority of professional and technical skills for interaction with the external ecosystem (universities, consulting agencies, technology companies).

Conclusions

Due to the structural-block combined qualitative and quantitative analysis, it can be concluded that the algorithm for creating and functioning DAO is based on the principle of inclusivity. Such advantages of the DAO as lack of hierarchy, earned leadership, responsibility for the work done, collective decision-making, transparency of management ensure maximum involvement of motivated participants and fair development opportunities. The criterion of science orientation is mainly manifested in the disadvantages of the DAO. This indicates that there are potential restrictions on scaling DAO projects precisely at the level of professional and technical skills of participants. Thus, it can be argued that DAO is a form of science-oriented entrepreneurship, and the active implementation of this organizational structure in business activities is associated with the risks of insufficient skills and knowledge of interested parties.

Prospects for further research

Taking into account the proven science orientation and inclusivity of the DAO, it is relevant to study the potential possibilities of applying these characteristics to the use of the DAO in various areas of business activity. Approaches to measuring the effectiveness of DAO in the development of a digital society are also of scientific interest.

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**ІНКЛЮЗИВНІСТЬ ТА НАУКОВООРІЄНТОВАНІСТЬ ДАО:
ПРОБЛЕМИ ТА ПЕРСПЕКТИВИ**

Розвиток дослідницької складової та компетенцій у підприємництві є особливо актуальним для реалізації та використання проєктів ДАО. Алгоритм створення і функціонування ДАО заснований на принципі інклюзивності. Відсутність ієрархії, заслужене лідерство, відповідальність за виконану роботу, колективне прийняття рішень, прозорість управління забезпечують максимальну залученість мотивованих учасників і справедливі можливості для розвитку. Активне впровадження ДАО в бізнес-діяльність пов'язане з ризиками недостатніх навичок і знань зацікавлених сторін.

Ключові слова: блокчейн, токени, криптовалюта, прийняття рішень, децентралізоване управління, інклюзивність, науковоорієнтоване підприємництво.