

Alignment of a Traditional Cooperative Identity to the Design of Decentralised Autonomous Organisations

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I. INTRODUCTION

Cooperatives, as a distinct type of organisation, were formed over 150 years ago and became an extensively used enterprise worldwide.¹ In modern times, cooperatives often renounce the core values behind the idea of cooperatives and restructure as investor-owned companies to compete with shareholder-owned companies in a fast-paced and globalising market.² Compared to cooperatives, the concept of a decentralised autonomous organisation (DAO) is a substantially younger idea. The DAO concept was considered to revolutionise the Ethereum blockchain platform³ and, after that, the entire domain of organising joint efforts for both for-profit and non-profit purposes. However, as Section 3 of the article shows, the first notable effort failed drastically and publicly. Overcoming the challenges that the concept faces would require substantial effort.⁴ If the grand ideas of the creators of the first DAO will come to fruition in further projects, we will witness decentralised organisations with a flat hierarchy that are run by smart contracts.

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¹ Samuli Skurnik, 'The Role of Cooperative Entrepreneurship and Firms in Organising Economic Activities - Past, Present and Future' (2002) 1 *The Finnish Journal of Business Economics* 103, 103.

² Jos Bijman and Onno van Bekkum, 'Cooperatives Going Public: Motives, Ownership and Performance' (7th International Conference on Management in Agri-Food Chains and Networks, Ede, the Netherlands, 31 May – 2 June, 2006)

<www.researchgate.net/profile/Jos_Bijman/publication/40116089_Cooperatives_Going_Public_Motives_Ownership_and_Performance/links/59de065baca272204c2c7429/Cooperatives-Going-Public-Motives-Ownership-and-Performance.pdf> accessed 3 February 2022.

³ Cristina Poncibò and Larry A DiMatteo, 'Smart Contracts: Contractual and Noncontractual Remedies' in Larry DiMatteo, Michel Cannarsa, and Cristina Poncibò (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology, and Digital Platforms* (Cambridge University Press 2019) 118, 138.

⁴ Kaal suggests a number of obstacles that future DAOs still need to overcome: "path dependencies, regulatory uncertainty, lingering suboptimal incentive designs, public policy, as well as market-, economic-, and technical limitations". Wulf A Kaal, 'Decentralized Autonomous Organizations – Internal Governance and External Legal Design' (2021) 20-14 *Annals of Corporate Governance Legal Studies Research Paper*, 21
<<http://dx.doi.org/10.2139/ssrn.3652481>> accessed 3 February 2022.

The present article provides an overview of solutions to create DAOs that would be resistant to potential exploits and analyses how the core of a traditional cooperative identity aligns with these design solutions. It claims that the cooperative form is better suited than a company governed by capital for a sustainable DAO design; at the same time, organising a cooperative as a DAO allows the former to solve some of the challenges that democratic governance creates for growing cooperatives. The following sections introduce the notions of traditional cooperative identity and a decentralised autonomous organisation.

II. CHALLENGES IN MAINTAINING A COOPERATIVE IDENTITY

Cooperatives are a diverse form of organisation. Speaking about cooperatives in general is a rather complicated task. There is very little consensus on what is a cooperative organisation between different jurisdictions. In Europe, the European Commission adopted the Statute for a European Cooperative Society (ECS) in 2003.⁵ However, the Statute's impact on the convergence of the cooperative field is minimal as very few ECSes were established following this Statute.⁶ Even within a single jurisdiction, there are frequently various types of cooperatives and different laws regulating them - consumer, worker, and production cooperatives.⁷ The cooperative legislation itself is permissive and allows multiple forms of organisational structure even within one cooperative form.⁸ One can add to that complexity the diversity of non-profit cooperatives, making the task even harder to complete. The present section focuses on for-profit cooperatives. When analysing the variety of cooperatives, one can find the distinctive characteristics of a cooperative by looking at the features of cooperatives and investor-owned companies. Cooperative forms can be classified on a scale ranging from

⁵ Council Regulation (EC) No 1435/2003 of 22 July 2003 on the Statute for a European Cooperative Society (SCE) [2003] OJ L 208/1.

⁶ A 2014 study reveals that in over 10 years following the adoption of the Statute, only 25 European Cooperative Societies were established. See: Ger JH van der Sangen, 'How to Regulate Cooperatives in the EU?', (2014) 4 *The Dovenschmidt Quarterly* 131-146, 134.

⁷ For example, Japan has ten acts regulating cooperatives, including Consumer Cooperatives Act, Fisheries Cooperatives Act, and Act on Cooperative Banking; the Republic of Korea has nine acts regulating different types of cooperatives, including the Framework Act on Cooperatives, Consumer Cooperatives Act, Agricultural Cooperatives Act, and Community Credit Cooperatives Act.

⁸ Chaddad and Cook describe how under the Western Australia Co-operatives Act 2009 an organisation can tailor to their needs a capital and membership rights structure on a scale ranging from a traditional cooperative to new Generation cooperatives organised as an investor-oriented firm: Fabio R Chaddad and Michael L Cook, 'Understanding New Cooperative Models: An Ownership–Control Rights Typology' (2004) 26 *Review of Agricultural Economics* 348.

traditional cooperatives to cooperatives almost identical to an investor-owned company (dividend cooperatives).

A traditional cooperative is a term used to identify cooperatives that follow the foundational principles of cooperative organisations that trace back to 1844, when they were recorded in the minutes of a meeting establishing the Rochdale Society of Equitable Partners (Rochdale Society). The main ideas of the principles are discussed further in the section. The Rochdale Society put the combination of principles into use with great success.⁹ That success was the catalyst for the worldwide adoption of the principles and the growth of the cooperative movement.¹⁰ Since then, the principles have been altered and developed. The most current version of the principles is established in the 1995 International Cooperative Alliance Statement on the Cooperative Identity (ICA Statement). The ICA Statement is the most crucial source for defining the cooperative identity.¹¹ National cooperative legislation takes account of the principles. However, many jurisdictions leave it to the bylaws of an organisation to determine the functioning of a cooperative and whether it should resemble a traditional or a dividend cooperative.

1. Cooperative principles

The ICA Principles are a valuable reference point for the study because they are incorporated in several countries, either directly or through reference.¹² Many cooperatives voluntarily include ICA principles in their bylaws even when national law does not require it.¹³

⁹ Paul Lambert, 'A Fresh Analysis of the Rochdale Principles: I' (1958) 78 Int'l Lab Rev 1, 2.

¹⁰ Ibid

¹¹ Antonio Fici, 'Cooperative Identity and the Law' (2013) 24 European Business Law Review 1, 38-39, 42; Silvia Sacchetti, and Ermanno Tortia, 'The Extended Governance of Cooperative Firms: Inter-Firm Coordination and Consistency of Values' (2016) 87.1 Annals of Public and Cooperative Economics 93, 96-97.

¹² Fici notes that the Cooperative Principle are reflected in the Cypriot Law on the Cooperative Societies Act 1985 (No. 22/1985), 6; Maltese Cooperative Societies Act XXX/2001 Art. 21, para. 2; Portuguese Cooperative Code 51/1996 Art. 3; Romanian Cooperative Act 1/2005 Art. 7, para. 3; Spanish Cooperative Act 27/1999 Art. 1, para. 1. See: Fici (n 11) 43, and Ville Pönkä, 'Are Cooperative Societies Transforming into Cooperative Companies? Reflections on the Finnish Cooperatives Act' (2019) 30 European Business Law Review 77; Frank Lowery, 'Legal Cooperative Framework Analysis Within the ICA-EU Alliance: National Report of Canada' (2020) 4 <<https://coops4dev.coop/sites/default/files/2021-03/Legal%20Framework%20Analysis%20-%20Canada.pdf>> accessed 3 April 2022.

¹³ Sonja Novkovic, 'Defining the co-operative difference' (2008) 37 Journal of Socio-Economics 2168. However, Waring, Lange, and Chakraborty question whether the principles became widespread due to benefitting to cooperatives or merely due to being easy to transmit. See: Timothy Waring, Taylor Lange, and Sujana Chakraborty, 'Institutional adaptation in the evolution of the co-operative principles' (2021) Journal of Evolutionary Economics 6.

At the same time, not all of the seven ICA principles¹⁴ translate into legal rules. Only those composing the core of the cooperative identity can have a legal effect. Those are principles from One to Three, dictating how a cooperative organisation should be formed and governed, and how its surplus should be distributed. The present article primarily focuses on the second and third principles.

The second cooperative principle provides:

“Cooperatives are democratic organisations controlled by their members, who actively participate in setting their policies and making decisions. [Cooperative] members have equal voting rights (one member, one vote).”

The principle of democracy is a cardinal rule lying at the core of the cooperative identity.¹⁵ Other principles reiterate the importance of democratic control.¹⁶ The principle establishes two rules. First, it is cooperative members who shall maintain control over the organisation. This principle lies at the core of some of the difficulties the cooperatives experience when financing their growth. More specifically, following this principle could be challenging for cooperatives that seek funding because it requires that the external financing does not dilute member control of the entity. The following section describes the challenges in more detail. Second, the principle provides that members should actively participate in the cooperative’s governance. The active role of cooperative members in decision-making is vital for the organisation’s development because it creates a competitive edge for cooperatives over investor-owned companies.¹⁷ Cooperatives try to implement several measures to battle the emergence of passive members.¹⁸

Cooperative governance follows a democratic principle of one member, one vote. This governance method highlights the difference between a cooperative and an investor-owned

¹⁴ 1. Voluntary and Open Membership; 2. Democratic Member Control; 3. Member Economic Participation; 4. Autonomy and Independence; 5. Education, Training, and Information; 6. Cooperation among Cooperatives; 7. Concern for Community.

¹⁵ Fici (n 11) 48; Lambert (n 9) 4; International Co-operative Alliance, ‘Guidance Notes to the Co-operative Principles’ 39 (2015), 15 <www.ica.coop/sites/default/files/basic-page-attachments/guidance-notes-en-221700169.pdf> accessed 3 February 2022.

¹⁶ The fourth cooperative principle stipulates that cooperatives may acquire capital from external sources, however, that should not endanger the democratic control of the organisation and its autonomy.

¹⁷ Frans Verhees, Panagiota Sergaki, and Gert van Dijk, ‘Building up active membership in cooperatives’ (2015) 14 *New Medit* 43.

¹⁸ For example, Birchall and Simmons describe the “umbrella strategy” that some consumer cooperatives have employed to stimulate governance by members in large cooperatives. The strategy relies on identifying groups of members to fill the governance, support, and loyalty roles for the promotion of member involvement. Johnston Birchall and Richard Simmons, ‘The Involvement of Members in the Governance of Large-Scale Co-Operative and Mutual Businesses: A Formative Evaluation of the Co-Operative Group’ (2004) 62 *Review of Social Economy* 493.

company. In a cooperative, regardless of the amount of capital invested, all members have an equal opportunity to influence the decision-making in the organisation. Member governance is an important safeguard that ensures democracy and prevents the centralisation of power by a shareholder who has contributed the most capital. As a result, members and not capital invested define governance in a traditional cooperative. Putting this principle into practice, especially as the cooperative grows in membership, may be challenging, as discussed below.

The third cooperative principle provides guidelines for the distribution of profits (surplus) in traditional cooperatives:

“Members contribute equitably to, and democratically control, the capital of their cooperative. At least part of that capital is usually the common property of the cooperative. Members usually receive limited compensation, if any, on capital subscribed as a condition of membership. Members allocate surpluses” for purposes supporting the development of the cooperative and other purposes approved by the membership.

The first outcome of this principle is that cooperative members do not receive dividends on the funds invested in the organisation. Although members contribute equitably to the cooperative's capital, they do not receive dividends in proportion to the capital contribution. Traditional cooperatives often tie the proportion of members part of profits to the interaction of this member with the cooperative. For example, the more a cooperative member uses the services of a cooperative, the more significant rebate such member will receive.

Another requirement of the third principle is that the cooperative distributes the surpluses to support the organisation and its purposes. Unlike investor-owned companies, cooperatives focus not on the growth of returns for capital investments but on contributing to their members¹⁹ and their respective communities. Adhering to this rule makes cooperatives far more resilient in times of economic crises.²⁰ These qualities allow cooperatives to have unique features

¹⁹ Hagen CK Henry, ‘Public International Cooperative Law’ in Dante Cracogna, Antonio Fici, and Hagen Henry (eds), *International Handbook of Cooperative Law* (Springer Berlin Heidelberg, 2013) 65, 82.

²⁰ In a report for the International Labour Organization, Birchall and Ketilson show that in the economic crises of the last decades, including the 2007-2008 financial crisis, cooperatives responded well to the new realities: financial cooperatives remained financially strong; consumer cooperatives increased turnover; worker cooperatives were growing. See: Johnston Birchall and Lou Hammond Ketilson, ‘Resilience of the Cooperative Business Model in Times of Crisis’ (2009) International Labour Office Sustainable Enterprise Programme 2.

associated with this specific type of organisation, boosting innovation and productivity²¹ and playing a leading role in improving the safety of goods.²²

National regulators recognise the value of cooperatives for the economy and society. In many countries, cooperative organisations receive legislative exemptions to support the functioning of these companies. For example, cooperatives may be subject to a special tax regime.²³ At the same time, as highlighted above, many national cooperative laws provide leeway on how the enterprise is structured. Such flexibility allows cooperatives to adopt the principles of structure and governance of investor-owned companies. While leaving the flexibility of cooperative bylaws, national regimes often stimulate cooperatives to follow the cooperative principles: tax law provides incentives only to those organisations that are structured and governed closely to the traditional cooperative model named above.²⁴

2. Challenges

Traditional cooperatives face challenges in modern economies. The article considers two of those: 1) difficulties in obtaining external equity funding and 2) the scaling of democratic governance. To address the challenges, some cooperatives adopt changes that move the organisations away from the cooperative principles.

Financing the growth of a cooperative through equity capital is more challenging than that of an investor-owned company. The amount of equity invested by each member in a traditional cooperative does not affect their governance rights in the cooperative. It also has a relatively small effect on each member's economic rights compared to that of an investor-owned company. As a result, existing members are often unwilling to increase their share in a cooperative because such an investment lacks liquidity and does not generate adequate

²¹ Nina Boeger, 'Shaping Corporate Reform: Social enterprise, cooperatives, and mission-led and employee-owned business' in Joseph Yockey and Benjamin Means (eds), *Cambridge Handbook of Social Enterprise Law* (Cambridge University Press 2019) 127.

²² Kazuhiko Mikami, 'Capital procurement of a consumer cooperative: Role of the membership market' (2010) 34 *Economic Systems* 178, 179.

²³ Francesco Forte, 'Cooperatives' Tax Regimes, Political Orientation of Governments and Rent Seeking' (2009) 2 *Journal of Politics and Law* 1.

²⁴ For example, Fici describes how in Italy cooperatives have relative freedom in defining their structure and governance in bylaws. At the same time, those cooperatives that stay close to cooperative principles, can enjoy a special tax treatment: Antonio Fici, 'Italian Co-operative Law Reform and Co-operative Principles,' (2010) EURICSE Working Paper 2/2010 <www.euricse.eu/wp-content/uploads/2015/03/WP_OO2_FICI.pdf> accessed 3 February 2022.

returns.²⁵ The same goes for outside investors who are used to receiving control over an entity in proportion to their investment to manage the risks.²⁶

Cooperatives try to adapt to these realities. Some entities allow non-member investors to take part in the organisation. Depending on the jurisdiction, that leads to the creation of so-called investor cooperatives (or dividend cooperatives; hybrid cooperatives). When a hybrid cooperative adopts the governance methods of investor-owned companies, it deviates from the democratic governance principle that is fundamental for the cooperative identity. Nilsson, however, considers that hybrid cooperatives operate within the “general understanding of the cooperative principles”²⁷. Cooperative principles do not prohibit attracting investor members. However, an essential condition for using resources of outside investors is that it should not dilute the control over the organisation from its members.

The principles of democratic governance work well for small cooperatives. But at a certain point, they create a threshold in the growth of a cooperative. Not many organisations can overcome this threshold without altering the principles on which they are built. Often, once an entity grows over a certain size, the ‘companisation’ of a cooperative takes place. Bager argues that the growth of a cooperative pushes it to adapt to the governance methods of investor-owned companies.²⁸ As opposed to the democratic principle of one member, one vote, centralised governance is one of the mechanisms that allows investor-owned companies to outperform cooperatives in the modern economy that requires fast decision-making.²⁹ For a long time, organisations had to choose between inclusivity in decision-making and effectiveness.³⁰ Some growing cooperatives reorganise into investor-owned companies to exercise more efficient control over their board of directors.³¹

²⁵ Chaddad and Cook (n 8) 358; Michael Cook and Constantine Iliopoulos, ‘Ill-Defined Property Rights in Collective Action: The Case of U.S. Agricultural Cooperatives’ in Claude Ménard (ed), *Institutions, Contracts and Organizations* (Edward Elgar Publishing 2004) 336.

²⁶ Mikami (n 23) 179.

²⁷ Jerker Nilsson, ‘Governance costs and the problems of large traditional co-operatives,’ (2018) 47 *Outlook on Agriculture* 87.

²⁸ Torben Bager, ‘Isomorphic processes and the transformation of cooperatives,’ (1994) 65 *Annals of Public and Cooperative Economics* 35.

²⁹ Daniela Maria Pozzobon and Decio Zylbersztajn, ‘Democratic Costs in Member-Controlled Organizations’ (2013) 29 *Agribusiness* 112.; Michael C Jensen, *A Theory of the Firm. Governance, Residual Claims, and Organizational Forms* (Harvard University Press, 2000) 198.

³⁰ Ewald Engelen ‘Corporate governance, property and democracy: a conceptual critique of shareholder ideology’ (2002) 31 *Economy and Society* 391, 401. Birchall and Simmons describe a similar choice cooperatives might need to make as a choice between “large and democratic. See Birchall and Simmons (n 18).

³¹ Leigh Drake and David Llewellyn, ‘The Economics of Mutuality: A Perspective on UK Building Societies’ in Johnston Birchall (ed), *The New Mutualism in Public Policy* (Routledge 2001).

Another threat to democratic governance is the need to employ agency in governance once a cooperative grows to a certain size.³² The bigger the cooperative becomes, the more interactions between decision-making members are needed to operate the organisation.³³ That necessitates the cooperative to employ agency relations in governance. The constraints of the article do not allow to go into the details of the agency relations definition. In the context of an organisation, the agent acts on the principal's behalf in the decision-making capacity that the principal delegated to the agent.³⁴ The topic is very polarised and contains as many opinions stating that agency theory is a dominant one determining corporate relations worldwide,³⁵ as opinions arguing that the separation of ownership and control in a corporation is a myth not founded on empirical evidence.³⁶ Without going further into this debate, the article stands on the minimal premise that the agency introduces an extra layer of legal relationships between ownership and control of the organisation. There are costs associated with that extra layer.

Deployment of agency generates costs for the cooperatives, such as the cost of decision-making and monitoring an agent. A cooperative that employs agency relations faces the risk that the agent's decision-making will cause losses for the entity (fraudulent actions of the agent being one example).³⁷ The organisation needs to monitor the agent to prevent corrupted behaviour and costs and damages associated with it, because an agent could choose to pursue its own interests, instead of the interest of those who appointed the agent. The cooperative needs to evaluate whether the costs of such monitoring do not outweigh the potential risks of mistakes or fraudulent behaviour of the agent.³⁸ Apart from the monitoring costs, a bigger group of decision-makers increases the cost of such decision-making.³⁹ Agency relations are a substantial part of the contemporary governance of hierarchically structured organisations. Following Posner and Glen, a significant portion of corporate law serves to mitigate the

³² International Co-operative Alliance (n 15).

³³ Nilsson (n 28) 2.

³⁴ Kaal (n 4) 13.

³⁵ Alexander Styhre provides a detailed overview of theoretical support afforded to the agency theory: Alexander Styhre, 'Trust versus contracts in corporate governance: agency theory, contractual theory and the fortification of shareholder welfare governance, (2016) 11 *Management & Organizational History* 276, 277-278.

³⁶ JB Heaton, 'Corporate Governance and the Cult of Agency' (2018) *SSRN Electronic Journal* 201; GF Davis and SK Stout, 'Organization Theory and the Market for Corporate Control: A Dynamic Analysis of the Characteristics of Large Takeover Targets, 1980-1990' (1992) 37 *Administrative Science Quarterly* 605, 627; Catherine M Daily, Dan R Dalton, and Albert A Cannella Jr, 'Corporate Governance: Decades of Dialogue and Data' (2003) 28 *The Academy of Management Review* 371, 372.

³⁷ Nilsson (n 28) 3.

³⁸ *Ibid*

³⁹ *Ibid*, 2.

agency's costs.⁴⁰ Being necessary for certain contexts, the reliance on agents brings with it detrimental factors, including costs and inefficiencies due to information asymmetry between principals and agents.⁴¹ Growing cooperatives need to find ways to mitigate these problems.

To sum up, the cooperative identity rests on a combination of principles. Cooperatives are sustainable organisations that are more resistant to market tribulations than investor-owned companies. At the same time, in the current market conditions, the very principles lying at the core of cooperative identity create a threshold for cooperative growth. The following section considers the notion of a decentralised autonomous organization and how its structure may help alleviate some of the costs and inefficiencies of agency relations standing in the way of cooperative growth without compromising democratic governance.

III. DECENTRALISED ORGANISATIONS

Organisations can use blockchain technology for different aspects of governance. The distributed ledger can record the information about the membership rights of shareholders. Smart contracts (computer programs embodying an agreement of parties that are deployed and executed on the blockchain, even without input from parties)⁴² can automate decision-making in an organisation.

Several studies discussed the possibility of using smart contracts in an organisation's governance⁴³ and the risks that it entails.⁴⁴ However, most of the analysis focuses on investor-owned companies.⁴⁵ The present article provides a view of how this concept can be used for

⁴⁰ Eric A Posner and E Glen Weyl 'Quadratic Voting as Efficient Corporate Governance' (2014) 81 The University of Chicago Law Review 251, 251.

⁴¹ Wulf A Kaal, 'Blockchain-Based Corporate Governance' (2021) 1 Stanford Journal of Blockchain Law & Policy.

⁴² Michel Cannarsa, 'Contract Interpretation,' in Larry DiMatteo, Michel Cannarsa, and Cristina Poncibò (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology, and Digital Platforms* (Cambridge University Press 2019) 102, 105.

⁴³ Harjit Singh, Geetika Jain, Alka Munjal, and Sapna Rakesh, 'Blockchain technology in corporate governance: disrupting chain reaction or not?' (2020) 20 Corporate Governance 67; Kevin J Fandl, 'Can Smart Contracts Enhance Firm Efficiency in Emerging Markets?' (2020) 40 Northwestern Journal of Int'l Law & Business 333; Dulani Jayasuriya Daluwathumullagamage and Alexandra Sims, 'Blockchain-Enabled Corporate Governance and Regulation,' (2020) 8 Int. J. Financial Studies 36; Anne Lafarre and Christoph Van der Elst, 'Shareholder Voice in Complex Intermediated Proxy Systems: Blockchain Technology as a Solution?' (2020) 4 Stanford Journal of Blockchain Law & Policy 29.

⁴⁴ Which in turn, opens many other risks and considerations. See Anja Eickstädt, Andreas Horsch, and Enrico Seidel, 'Potentials and Limitations of Smart Contracts: A Primer from an Economic Point of View' (2020) 31 European Business Law Review 169, 180.

⁴⁵ See, also Kaal who analyses the use of DAO structure in a venture capital organisation: Wulf A Kaal, 'Reputation as Capital – How DAOs Upgrade Finance' (2021) <<https://ssrn.com/abstract=3949098>> accessed 3 February 2022.

cooperatives and the benefits that the traditional cooperative form can bring to an organisation governed on the blockchain.

The use of blockchain in governance is not an unknown concept for cooperatives. For example, a 2021 study of Finnish cooperatives revealed that out of 132, twenty-six organisations are aware of blockchain's possibilities in an organisation's decision-making. Moreover, four of those are already using it in governance, and five more cooperatives have run experiments on its implementation.⁴⁶ However, they use it to a smaller extent than that considered in the present article.

Implementation of blockchain in governance can have different magnitudes. On a smaller scale, a cooperative may use blockchain to hold general meetings or for the functioning and decision-making by an executive body of a cooperative.⁴⁷ A more challenging and, at the same time, a potentially more rewarding leap is building an organisation that is run entirely on smart contracts. The concept of such an entity has existed for quite some time, and it is commonly referred to as a Decentralised Autonomous Organisation (DAO).⁴⁸ Ideally, the secure nature of the distributed ledger technology would allow the execution of governance decisions on the chain while minimising the risk of corruption by decision-makers.

A DAO is governed on the blockchain through smart contracts. But it does not necessarily need to operate in a business area based on the distributed ledger technology.⁴⁹ In the series of 2013 articles where Buterin introduces DAO, he also notes the multitude of challenges that need to be resolved before any DAO may come to existence and the fact that the concept of DAO might not be able to realise itself in practice.⁵⁰ The interest in the topic spiked in June

⁴⁶ Yi Zheng, (2022) *Interview of Finnish cooperatives* (unpublished).

⁴⁷ Tokmakov argues that this step could make the general meeting and the executive body permanent governance bodies since they exist online. See MA Tokmakov, 'Corporate Governance Modernization: Legal Trends and Challenges' (2019) 71 SHS Web of Conferences 2.

⁴⁸ Poncibò and DiMatteo (n 3), 139; Laila Metjahic, 'Deconstructing The DAO: The Need for Legal Recognition and the Application of Securities Laws to Decentralised Organisation' (2018) 39 *Cardozo Law Review* <<http://cardozolawreview.com/deconstructing-the-dao-the-need-for-legal-recognition-and-the-application-of-securities-laws-to-decentralized-organizations>> accessed 3 February 2022; Anja Eickstädt, Andreas Horsch, and Enrico Seidel, 'Potentials and Limitations of Smart Contracts: A Primer from an Economic Point of View' (2020) 31 *European Business Law Review* 169, 178.

⁴⁹ For example, Mannan describes the possibilities of creating a DAO cooperative functioning in the sphere of producing tangible goods. See Morshed Mannan, 'Fostering Worker Cooperatives with Blockchain Technology: Lessons from the Colony Project,' (2018) 3 *Erasmus Law Review* 190.

⁵⁰ Vitalik Buterin, 'Bootstrapping A Decentralized Autonomous Corporation: Part I' (19 Sep 2013) <<https://bitcoinmagazine.com/technical/bootstrapping-a-decentralized-autonomous-corporation-part-i-1379644274>> accessed 8 June 2022.

2016.⁵¹ The reason for the attention was the launch of the first major organisation run as a decentralised autonomous organisation - The DAO.

The DAO was built entirely on code and smart contracts. Instead of by-laws and articles of association, The DAO had smart contracts. It was not incorporated as any form of enterprise. It did not have any physical address, headquarters or traditional corporate structure. The founders aimed to create an organisation functioning as a “venture capital fund for the crypto and decentralized space.”⁵² The DAO became a well-known example for many reasons. First, it was the most significant coin offering campaign, raising 150 million USD.⁵³ Second, the code of the smart contracts that were the basis of the DAO was flawed, and a member was able to exploit mistakes in the DAO design and steal one-third of funds from the DAO.⁵⁴ Third, on top of that, the US Securities Exchange Commission investigated The DAO and found that its tokens were securities and that the issuers did not comply with the securities regulations.⁵⁵

Despite the flaws, The DAO also proved hypotheses regarding governance through smart contracts. Members were able to change the bylaws by changing the software code.⁵⁶ Similarly to the amendment of traditional bylaws, a voting mechanism facilitates such change.⁵⁷ The structure of the DAO resembled more that of an investor-owned company rather than a cooperative. The proportion of tokens held by members (and correspondingly invested capital) defined the voting power in the organisation's governance.⁵⁸ This is typical of an investor-owned company. As discussed in the previous section, traditional cooperatives are governed democratically without the link to the invested capital.

⁵¹ Cf Google Trends, Decentralised Autonomous Organisation <<https://trends.google.com/trends/explore?date=2014-09-09%202022-01-31&q=%2Fm%2F0111jb41>> accessed 3 February 2022.

⁵² Kaal (n 4) 9.

⁵³ Saman Adhami, Giancarlo Giudici, and Stegano Martinazzi, ‘Why do businesses go crypto? An empirical analysis of initial coin offerings’ (2018) 100 *Journal of Economics and Business* 64, 67

⁵⁴ Poncibò and DiMatteo (n 3) 139.

⁵⁵ The United States Securities and Exchange Commission, Report of Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934: The DAO, Release No. 81297/July 25, 2017 <www.sec.gov/litigation/investreport/34-81207.pdf> accessed 3 February 2022.

⁵⁶ Metjahic (n 4) 1543; Carla L Reyes, ‘If Rockefeller Were a Coder’ (2019) 87 *George Washington Law Review* 373, 392.

⁵⁷ Kaal (n 4) 9; Christoph Jentzsch, ‘Decentralized Autonomous Organization to Automate Governance’ 2 (unpublished manuscript)

<<https://lawofthelevel.lexblogplatformthree.com/wpcontent/uploads/sites/187/2017/07/WhitePaper-1.pdf>> accessed 3 February 2022.

⁵⁸ Quinn DuPont, ‘Experiments in algorithmic governance: A history and ethnography of “The DAO”, a failed decentralized autonomous organization’ in Malcolm Campbell-Verduyn, *Bitcoin and beyond: Cryptocurrencies, blockchains, and global governance* (Routledge 2017) 157.

In contractual relations, smart contracts have limitations⁵⁹ due to their inflexibility and being too specific, compared to purposefully vague legal contracts.⁶⁰ However, already now, in some spheres, smart contracts, given their still early development phases, can be employed with impressive results.⁶¹ Even with all the flaws, The DAO example is demonstrative in this respect. The DAO had over ten thousand members. All the members had access to running the organisation (defined by the share of their capital). It is striking that The DAO did not employ agency relations to facilitate the governance - the organisation of a considerable magnitude was run directly by the members. It is rather hard (if not impossible) to find an example of an entity that operates by such a substantial number of members without employing an agent facilitator.

Governance has its costs. Hansmann highlights three types of costs associated with governance in an organisation: 1) costs of decision making; 2) costs of controlling the managers; 3) costs caused by mistakes in decision making⁶². An effective DAO design can significantly reduce the costs of agency and monitoring.⁶³ Blockchain ensures trust and transparency⁶⁴ and thus helps to reduce an agency's costs and inefficiencies in governance. Out of the above-listed costs, smart contracts can potentially decrease the costs of decision-making and controlling the managers. There is no need to involve agency relations when using smart contracts because the governance rights holders execute their rights directly by interacting with the blockchain, as "The DAO" example showed.

The structure of a DAO can eliminate the need to bear the costs of monitoring decision-makers for fraudulent actions. First, the governance can be designed for the direct participation of the members in the decision-making without involving the agent. Since no agent acts in these relations, the organisation does not need to bear the costs of monitoring the agent. Second,

⁵⁹ Poncibò and DiMatteo (n 3) 128

⁶⁰ Due to the many criticisms that the concept received for being applied to computer programs that are not contracts in the legal meaning, smart-contracts are sometimes referred to as "legal smart-contracts". See Larry A DiMatteo, Michel Cannarsa, and Cristina Poncibò, 'Smart Contracts and Contract Law' in Larry A DiMatteo, Michel Cannarsa, and Cristina Poncibò (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge University Press 2019) 9; Michel Cannarsa, 'Contract Interpretation' in Larry A DiMatteo, Michel Cannarsa, and Cristina Poncibò (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge University Press 2019) 104.

⁶¹ See, for example, how Sun et al. describe the potential of smart-contracts application in the insurance industry. Ruo-Ting Sun, Aravinda, Garimella, Wencui Han, Hsin-Lu Chang, and Michael J Shaw, 'Transformation of the Transaction Cost and the Agency Cost in an Organization and the Applicability of Blockchain—A Case Study of Peer-to-Peer Insurance' (2020) *Frontiers in Blockchain* 13 < www.frontiersin.org/articles/10.3389/fbloc.2020.00024/full >

⁶² Henry Hansmann, *The Ownership of Enterprise* (Belknap Press 2000) 21.

⁶³ Kaal (n 4) 10

⁶⁴ Sun et al. (n 63)

if an agent is present in a DAO, the need to monitor compliance of its decisions with the articles of association is reduced. The right-holders execute governance rights within limits prescribed by the code, and the code can be executed only when specific conditions are met. The use of smart-contracts means that the governance decisions may be executed automatically. Automatic enforcement of decisions makes redundant the need for monitoring.⁶⁵ Managers are not able to act contrary to bylaws that are written in code.⁶⁶

Finally, smart contracts allow an organisation to be run transparently. Information is stored on the blockchain and is available to all members. This reduces the need for external audits and saves the costs that are traditional to the agency. In agency relations, owners need to periodically use the external audit to control the agent to ensure that they act in the interest of shareholders (or stakeholders).⁶⁷ The agency theory suggests that to reduce agency costs, a company must incur additional monitoring costs.⁶⁸ In a transparent DAO, members can exercise ongoing decentralised audits of the company's actions. Member-owners have continuous direct access to the relevant information.

Decentralised governance may aid with the challenges that growing cooperatives face, however, to a limited extent. Even with a DAO structure, democratic decision-making will be outpaced by the centralized decision-making of an investor-owned company.⁶⁹ But, as follows from the cooperative principles, the fundamental goals of members joining a cooperative differ from those of the shareholders in an investor-owned company. Members join cooperatives not for their competitive market advantages. Cooperatives do not necessarily need to outpace corporations to meet their objectives. A DAO structure allows cooperatives to stretch the growth threshold further by alleviating agency costs and stimulating member participation in governance.

1. DAO needs and limitations

In the meantime, plenty of risks dominate the idea of decentralised autonomous governance. Smart contracts have limitations. They can regulate and execute governance rules

⁶⁵ Kaal (n 43) 6

⁶⁶ Reyes (n 58) 404

⁶⁷ Kevin Keasey and Mike Wright, 'Issues In Corporate Accountability and Governance: An Editorial' (1993) 23 *Accounting and Business Research* 291, 291.

⁶⁸ Michael C Jensen and William H Meckling, 'Theory of the firm: Managerial behavior, agency costs and ownership structure, *Journal of Financial Economics*' (1976) 3 *Journal of Financial Economics* 305, 323.

⁶⁹ Lafarre and Van der Elst (n 45).

in an entity. But to do so efficiently, they need to be much more detailed than the articles of association. Because for an entity domiciled in a particular county, the national law of that jurisdiction will complement any blanks in the articles of association. The legislation will also be supplemented by court and administrative practice construing the regulations. The code of smart-contracts needs to cover all that diversity of rules from the start for the very reasons that corporate legislation exists in national jurisdictions - “to facilitate and regulate the conduct of the corporate enterprise”.⁷⁰ Smart contracts are limited by the pre-defined processes that are coded into them. They can only execute predefined actions and processes.⁷¹ As a result, smart contracts cannot eliminate other forms of decision-making. But they can take on some of the decisions themselves, thus decreasing the costs of making collective decisions. The concept of DAO will be developing in the long run, along with the gradual implementation of blockchain in different spheres of life. Correspondingly, new answers to the challenges that DAOs face might be discovered. The present article, being focused on cooperatives, suggests solutions for two of the obstacles that the DAO concept yet needs to overcome - sustainable decentralisation design and legal anchoring.

2. *Legal anchor*

As noted above, The DAO was not incorporated in any jurisdiction and, as such, was not a legal entity. Instead, an association of people united for a common purpose. Legal recognition of a DAO is approached differently in various jurisdictions. However, the lack of legal personality might not prevent DAOs from participating in commercial relations. Some authors consider that DAOs can exist only on-chain, create their own governance rules and have no point of intervention for law rules.⁷² But for any off-chain interactions, DAOs will need to have a form recognised by the law - a “legal wrapper” (legal anchor).

There are several reasons for establishing a legal anchor. Some actions are not possible off-chain without being a registered legal entity. For all the things on-chain, a DAO can exist without being a legal entity. But once it contracts with external parties off-chain - it will need to have a legal anchor, for example, for renting an office, purchasing land, or interacting with national public registers of rights. Apart from that, having a legal wrapper potentially decreases

⁷⁰ Melvin A Eisenberg, ‘Corporate Law and Social Norms’ (1999) 99 Colum L Rev 1253, 1253.

⁷¹ Lennart Ante, ‘Smart Contracts on the Blockchain – A Bibliometric Analysis and Review’ (2020) 57 Telematics and Informatics 5.

⁷² Tokmakov (n 49) 3; see also Usha Rodrigues, ‘Law and the Blockchain’ (2018) 104 Iowa Law Review 679.

the entity's contracting costs. The third parties who contract with such an organisation want to mitigate counterparty-related risks (in the event of a counterparty default). Such additional measures would increase the costs of contracting.

Without a legal wrapper, a DAO will look in the eyes of the law as it is - a contract-based organisation. An organisation that functions through a network of interconnected contracts between its members or between members and external parties. This form of contracting is not new to the law. In many jurisdictions, this form is regulated as a general partnership.⁷³ A general partnership is an unincorporated association.⁷⁴ A general partnership agreement between members does not create a separate legal entity.⁷⁵

Being recognised as a general partnership has a substantial drawback for the members - members bear unlimited liability for the legal relations entered by the partnership. One can, of course, limit liability in a contract. So that the external parties will contract with the general partnership (DAO) on the conditions that the liability of members of the partnership is limited. But this comes with two caveats. First, DAO will need to have the limitation of liability clause in the contracts, and the counterparties need to accept it. Second, such a clause will only limit contractual liability and will not influence potential tort damages or claims arising out of e.g. consumer protection laws.⁷⁶

National legislation providing a solution for a DAO legal wrapper is still relatively scarce; however, some DAO-specific laws exist. For example, the State of Wyoming passed a bill providing for the formation and management of decentralised autonomous organizations. This act allows a DAO to have the legal wrapper of a Wyoming⁷⁷ limited liability company.⁷⁸ The

⁷³ Kaal (n 4) 3.

⁷⁴ At the same time, SEC in its decision over The DAO concluded that despite similarities with the general partnership, some aspects of The DAO structure bore “little resemblance to that of a genuine general partnership”. See The United States Securities and Exchange Commission <www.sec.gov> accessed 8 June 2022

⁷⁵ In some countries a general partnership agreement can create a separate entity. Like in the US, the 1997 United Partnership Act that is enacted in the majority of US states, provides that stipulates that the partnership creates a legal personality distinct from its members. Uniform Partnership Act (1997), Sections 201(a), 307(a).

⁷⁶ Kaal (n 4) 26. See also Timothy Nielsen, ‘Cryptocorporations: A Proposal for Legitimizing Decentralized Autonomous Organizations’ (2020) 5 Utah Law Review 1105, 1115.

⁷⁷ For example, the CityDAO incorporated as a Wyoming DAO LLC purchased land in Wyoming. See Kamila Kudelska, ‘Blockchain company buys land as a group under unique Wyoming law’ (Wyoming Public Radio, 25 January 2022) <www.wyomingpublicmedia.org/open-spaces/2022-01-25/blockchain-company-buys-land-as-a-group-under-unique-wyoming-law> accessed 3 February 2022.

⁷⁸ For details, see State of Wyoming Senate File no. SF0038 (2021) <www.wyoleg.gov/2021/Introduced/SF0038.pdf> accessed 3 February 2022.

limited liability company framework for a DAO was also previously established in Vermont as a Blockchain-based Limited Liability Company.⁷⁹

In the lack of special legislation, DAOs use established corporate legal frameworks, including the cooperative form. The idea of using the cooperative form as a wrapper for the DAO is not new. There are examples of organisations incorporated in this form.⁸⁰ The Rchain Cooperative and The Employment Commons LCA are examples of decentralised cooperative organisations functioning in the blockchain sphere. For example, the latter is a cooperative established under the Colorado Uniform Limited Cooperative Association Act.⁸¹ The organisation provides its members (primarily self-employed individuals) the employee benefits and various small-business-related services. It provides access to health insurance, retirement, and savings options. Following the organisation's bylaws, the members that use the services are rewarded with patronage dividends depending on members' activity with the cooperative.⁸²

The cooperative form may provide the association members with the legal anchor with all the benefits attached to it (limited liability and the possibility to counteract with parties off-chain). The advantage of using a cooperative as a legal anchor for DAO is that the cooperative form is very flexible and based on described above principles. Apart from the principles, many national laws are remarkably tolerant of how a cooperative operates, and that is reflected in the diversity of cooperative forms around the world.⁸³ The following section shows that, apart from using the cooperative form as a legal anchor, adhering to cooperative principles benefits the DAO's longevity.

The principles of the cooperative form allow a DAO to maintain its decentralisation. Even having a legal wrapper, a DAO may face problems with longevity because maintaining

⁷⁹ The rule was added as a subchapter 012 to the Corporations, Partnerships And Associations title of Vermont statutes.

⁸⁰ Kaal notes that the Swiss Association is used as an anchor for DAOs. See, Kaal (n 4) 44. The Swiss Association is an organization that is governed by its members and not capital. Although this aspect is similar to the reviewed cooperative principles, the Swiss association is a non-profit organization and for this reason is not comparable to cooperatives that are considered in the article. See, Article 60 of the Swiss Civil Code <www.fedlex.admin.ch/eli/cc/24/233_245_233/en> accessed 8 June 2022.

⁸¹ Employment Commons LCA, BYLAWS, available at <<https://opolis.gitbook.io/legal/bylaws>> accessed 8 June 2022.

⁸² Ibid, Article V

⁸³ For example, Finnish Cooperatives Act provides cooperatives with a substantial bylaw autonomy. See Ville Pönkä, 'Are Cooperative Societies Transforming into Cooperative Companies? Reflections on the Finnish Cooperatives Act' (2019) 30 European Business Law Review 77, 82-87. Similarly, Australian cooperatives receive substantial bylaw autonomy. See Co-operatives Act (2009) No 024, Ministry for Commerce, Western Australia, available at <www.legislation.wa.gov.au/legislation/statutes.nsf/main_mrtitle_11234_homepage.html> accessed 8 June 2022.

decentralisation is crucial for a DAO. Without proper structure design solutions, the organisation will tend to drift towards centralisation. To prevent member corruption and attempts to exploit the organisation for individual profits at the expense of the other members,⁸⁴ certain safeguards to decentralisation need to be established in the structure of a DAO.

IV. DAO DESIGN AND COOPERATIVE PRINCIPLES

Once a DAO becomes centralised, it fails as a concept.⁸⁵ DAO designers offer a set of measures that aid in preventing centralisation. Among a group of such solutions, the present section considers a selected few: 1) governance voting design is based on reputation tokens; 2) members receive reputation tokens by contributing to the organisation; 3) reputation tokens are non-fungible; 4) depreciation in value of reputation tokens unused in governance; 5) dividends to members are paid in fungible tokens; however, 6) fungible tokens are distributed to members in proportion to non-fungible tokens that they hold.⁸⁶ Other measures include full transparency⁸⁷ and anonymity of members and the design of salary tokens as stablecoins.⁸⁸ However, they are not selected for the analysis because they are not relevant (although not impossible) in the context of cooperative principles. The named solutions can be divided into categories based on whether they relate to governance or profit distribution.

1. Governance

The section first considers the DAO design solutions aimed at the decentralisation of governance. These measures, combined, achieve the goal of unlinking the governance rights from the invested capital. The direct correlation between money invested and governance rights is best seen in an investor-owned company example, where the voting power follows the volume of investment in company shares.⁸⁹ Design solutions aimed at governance are those listed under 1-4 above.

The first measure suggested is that the decision-making powers should be based not on the tokens representing capital invested in an organisation but should instead be based on merit

⁸⁴ Craig Calcaterra, 'On-Chain Governance of Decentralized Autonomous Organizations: Blockchain Organization Using Semada' (2018) 7 SSRN < <https://ssrn.com/abstract=3188374> > accessed 3 February 2022.

⁸⁵ Kaal (n 4) also suggests that tying DAO to a particular jurisdiction and as a result having a representative in this jurisdiction, leads to the centralisation of the organisation and its subsequent fall as a DAO.

⁸⁶ Kaal (n 43) 20.

⁸⁷ Calcaterra (n 86) 4.

⁸⁸ Kaal (n 43) 20.

⁸⁹ Henry G Manne, 'Some Theoretical Aspects of Share Voting. An Essay in Honor of Adolf A. Berle' (1964) 64 Columbia Law Review 1427, 1429.

identifiers tied to the member's contribution to the organisation. Such merit identifiers can be tokenised as “reputation tokens”.⁹⁰ The members of a DAO would thus receive different types of tokens— those linked to membership and capital contribution to the equity of the organisation (share tokens); and those unlinked from equity— reputation tokens. Share tokens are not involved in the governance of the DAO. They serve as a recognition (and essential condition) of membership. Reputation tokens, on the other hand, are not linked to the capital invested. These tokens will be distributed to members based on other merit identifiers.

The second DAO design solution proposes that the reputation tokens, which form the foundation for the governance, are distributed to members based on the volume of their contribution to the organisation. Members are thus rewarded with reputation tokens when they perform actions that benefit the entity.⁹¹ Contributing to a DAO thus becomes both short-term and long-term advantageous for the members. Short term, they receive reputation tokens that increase the member’s influence over the governance in the organisation. In the long term, by performing actions that strengthen the company, they increase its value (and thus potentially increase the value of share tokens they hold).

The third element of decentralisation requires that the reputation tokens are non-fungible. Non-fungible tokens use a different token standard⁹², are unique and not interchangeable.⁹³ This type of tokens received substantial attention from intellectual property lawyers due to its extensive use in the collectibles market.⁹⁴ However, discussions regarding their use in corporate law are also emerging.⁹⁵ Potentially, they can be locked to unique member identifiers and thus not transferrable to any potential buyers.⁹⁶ As a DAO design solution, an organisation

⁹⁰ Kaal (n 43) 24.

⁹¹ Ibid, 25.

⁹² The majority of fungible tokens are built using the ERC-20 standard.

⁹³ Andrés Guadamuz, ‘The treachery of images: non-fungible tokens and copyright’ (2021) 16 *Journal of Intellectual Property Law Practice* 1367, 1369.

⁹⁴ See, for example, K Parikshith Arvindan, ‘Non-Fungible Tokens – An Overlap between Blockchain Technology and Intellectual Property Rights’ (2021) 1 *Jus Corpus Law Journal* 357; Katya Fisher, ‘Once upon a Time in NFT: Blockchain, Copyright, and the Right of First Sale Doctrine’ (2019) 37 *Cardozo Arts & Ent Law Journal* 629.

⁹⁵ Yuliya Guseva, ‘A Conceptual Framework for Digital-Asset Securities: Tokens and Coins as Debt and Equity’ (2020) 80 *Maryland Law Review* 166; Jerry Brito, Houman Shadab, and Andrea Castillo, ‘Bitcoin Financial Regulation: Securities, Derivatives, Prediction Markets, and Gambling’ (2014) 16 *Columbia Science & Technology Law Review* 144.

⁹⁶ According to Vitalik Buterin, currently, such types of tokens (soulbound tokens) are an “unexplored” space. See, Vitalik Buterin, Soulbound (26 Jan 2022) <<https://vitalik.eth.limo/general/2022/01/26/soulbound.html>> accessed 8 June 2022.

will issue these tokens⁹⁷ and distribute them to the members based on their contributions. Members would be able to use these tokens in governance and in exercising their economic rights. However, they could not transfer or sell these tokens to other members.

In the final governance-related design solution, the reputation tokens should depreciate in value (in terms of governance and other rights they provide) if not used in governance. This measure would stimulate members to be active in decision-making. The need to motivate a DAO's members to participate in the voting is evident when considering The DAO example. Despite the novelty of the concept and The DAO being a venture company and governance directly influencing the members' monetary prospects and rights, only 5% of members took part in voting.⁹⁸ Other DAO projects took dedicated effort to increase member participation in governance, resulting in a substantial increase in voter participation. However, even the special voting protocols in these entities result in less than 50% of voters.⁹⁹ And since DAO does not employ an agent (a professional tasked with the governance function), no one could substitute non-participant members in running the organisation.

If incentivised (by value depreciation of unused NFTs) to take part in governance, such members will make decisions that benefit the organisation to the best of their abilities. In administering governance, the members will vote for the result that increases the value of their membership while simultaneously increasing the value of the organisation in the long term.

This group of measures combined reflects the second and third cooperative principles— a DAO is built as a democratic organisation controlled by the members. Members contribute equity to the capital of the organisation; however, the governance is based on individual members and not on the money invested. Members actively participate in policy-setting and decision-making.

Traditional cooperatives are democratic organisations. A DAO that intends to maintain its decentralisation needs to be governed democratically. Otherwise, it bears a risk that a member or group will accumulate governance powers, and the organisation will become centralised. As a result, governance rights should be unlinked from the equity contribution. Members still need to contribute to the equity of the organisation as this is an essential source of cooperative

⁹⁷ At the moment, the implementation of this design might meet certain obstacles. For example, currently, minting an NFT consumes substantial amount of energy. As a result, a DAO design that requires constant production of NFTs will not be an ecologically sustainable choice.

⁹⁸ Eduardo Gómez, 'The DAO Undergoes Low Voting Turnout' *The Merkle* (Online, 11 June 2016) <<https://themerke.com/the-dao-undergoes-low-voting-turnout>> accessed 8 June 2022.

⁹⁹ Kaal (n 43) 16.

capital. However, the amount of this contribution does not affect governance rights of a member. The cooperative principles require that democratic governance is realised through the one member, one vote principle. When looking at the ICA guidelines, this principle should be understood through the prism of member/capital governance.¹⁰⁰ The sustainable DAO design requires that the decision-making rights are based on merit identifiers of members. As a result, the cooperative principles and the principles of DAO design coincide because they both require that the governance should be based on members and not on capital.

An investor-owned company organised as a DAO, even if governed directly by token holders, still leaves space for type II agency conflicts – conflicts between controlling and minority shareholders.¹⁰¹ In contrast, traditional cooperatives do not attribute governance rights to members in proportion to the capital contribution and are governed democratically, thus alleviating the risks of such conflicts.

Cooperative principles require that members actively participate in decision-making. The sustainable DAO design pursues the same goal. Issuance of reputation tokens stimulates actions that contribute to the organization. A DAO motivates members to participate in the voting and decision-making by devaluing unused reputation tokens.

2. *Profit distribution*

The second group of DAO design solutions concerns the distribution of profits by the organisation. They require that 1) the dividends to members are paid not in proportion to the capital invested but corresponding to merit identifiers of this member, and 2) dividends are paid in fungible tokens. These measures reflect the third cooperative principle - Member Economic Participation.

The first part of this DAO design proposition requires that the organisation distributes its profits to members not based on the capital invested but in proportion to the non-fungible reputation tokens that a member holds. Reputation tokens are tied to unique member identifiers and cannot be transferred to other members. As a result, a member would not be able to increase one's governance power or proportion of dividends received by purchasing reputation tokens. Structuring it otherwise would put at risk the decentralisation of the organisation. Instead, the

¹⁰⁰ International Co-operative Alliance (n 11) 18, 26.

¹⁰¹ For more on that, see, Susan P Shapiro, 'Agency theory' (2005) 31 Annual Review of Sociology 263; Qianhua Lei, Bingxuan Lin, and Minghai Wei, 'Types of agency cost, corporate governance and liquidity' (2013) 32 Journal of Accounting and Public Policy 147.

only way to receive reputation tokens would be by initially receiving them as a reward for contributing to the organisation. That would incentivise members to engage in conduct that is valuable to the DAO.¹⁰²

Secondly, the dividends should be paid in fungible tokens to keep members financially motivated to acquire more reputation tokens. Fungible tokens can be traded on cryptocurrency exchanges or exchanged for fiat money. As a result, members wishing to receive fungible tokens would need to acquire more reputation tokens. And to do that, they would need to contribute to the organisation and receive NFTs in return.

These DAO design solutions reflect the third cooperative principle: the compensation to members is not tied to the capital contributed to the organisation; instead, members are paid “dividends” in proportion to their interaction with the organisation.

Because of that, potential members will not regard the cooperative as an investment vehicle that only requires equity capital contribution. Cooperative member shares are not designed with the return of profit in mind. They only grant cooperative membership, provide voting rights, and a limited compensation that is not defined by the member capital contribution. Members receive a part of the organisation’s surplus as cooperative rebates - payments that are determined by the member’s usage of cooperative services and not the capital investment. Unlike an investor-owned company, a traditional cooperative identity is designed to attract active members who take a role in the life of the organisation beyond mere capital investment. Because of that, it is not the return on investment that attracts new members. Instead, members join a cooperative to take part in the joint effort of the organisation or the usage of cooperative services.¹⁰³

Similarly, in a sustainable DAO design, the profits received by members are not defined by the amount of the initial capital contribution. Members do receive part of the profits of the DAO, and these profits (unlike reputation tokens) will be paid in fungible tokens. Yet, the amount of the fungible tokens that a member receives is dictated by the number of reputation tokens - similarly to how cooperative rebates are paid in proportion to member interaction with

¹⁰² Kaal (n 43) 25.

¹⁰³ Legislation of some countries specifically restrict the services of cooperatives to only members of a cooperative. For example, the Japanese Consumer Cooperatives Act generally allows provision of cooperative services only to members. See Takeshi Suzuki (ed transl), ‘A Brief Chronicle of the Modern Japanese Consumer Cooperative Movement’ (2010) based on the writing in the same title by Yoshiaki Saito, (2010) Japanese Consumers’ Co-operative Union 120.

the cooperative. The separation between the reputation tokens and fungible tokens creates incentives for the active participation of members in contributing to the organisation.

The sustainable DAO design requires members to contribute to the organisation's equity through the membership fee. At the same time, the amount of this contribution does not entitle the member to any additional governance or financial rights towards the company. Instead, it is the member's actions for the benefit of the company that increase both the member's governance rights and one's financial rewards. As a result, this design solution makes the organisation attractive only to those potential members who plan on taking a somewhat active part in its functioning, not only through capital contribution. In turn, that also reflects the first cooperative principle that cooperatives are "open to all persons able to use their services and willing to accept the responsibilities of membership". This principle highlights that the value of joining a cooperative is not in generating future financial returns but instead in using the services of a cooperative. The financial returns (rebates) are merely a design solution that should stimulate the use of cooperative services. The fact that DAO dividends are paid in fungible tokens is not contrary to a traditional cooperative identity. As stated above, cooperatives are for-profit companies. The option of sharing the profits among members in correlation to their interactions with the cooperative is directly provided for in the cooperative principles.

3. DAO legal wrapper based on cooperative principles

Following the foundational cooperative principles (principles 1-3) helps DAOs to maintain decentralisation, as described above. Cooperative principles were not designed to translate into legal principles from the start.¹⁰⁴ However, often it is the first three principles that are included in the cooperative legislation of national jurisdictions. The DAO design solutions do not name cooperative form as a legal anchor for decentralised organisations. However, there are already DAOs that have the cooperative form as a legal wrapper.¹⁰⁵ And as the present article shows, sustainable DAO design solutions align with the core mechanisms of the traditional cooperative identity.

¹⁰⁴ Ville Pönkä, 'The Current Status and Future Prospects of International Cooperative Law Research' (2020) 14 *International and Comparative Law Journal* 6.

¹⁰⁵ For example, The Employment Commons Limited Cooperative Association. See Opolis, 'About Opolis & The Employment Commons' < <https://opolis.co/faq/> > accessed 3 February 2022.

Other corporate forms would not be accommodating to the demands of decentralisation listed above. For example, the already mentioned Decentralized Autonomous Organization Supplement to the Wyoming Limited Liability Company Act does not allow the implementation of these measures. The Supplement provides a default rule tying the votes of a Wyoming DAO LLC member to the amount of member's contribution to the capital of the company.¹⁰⁶

Adapting some of the decentralisation strategies can help growing traditional cooperatives to overcome the challenges they face. A decentralised structure allows the organisation to lower the costs of agency relations. Using the reputation tokens as a base for cooperative rebates payment can help in solving the problem of motivating members to actively use cooperative services and provide value to the organisation because that affects the number of fungible tokens a cooperative member receives. Depreciation of the value of unused NFTs will stimulate more active participation in cooperative governance.

V. CONCLUSION

This article has explored the alignment between traditional cooperatives and decentralised autonomous organisations. Cooperative principles have been replicated many times, but their core remained the same for over a century. Traditional cooperatives have long been a viable alternative to investor-owned companies. However, in a fast-paced economy, cooperatives, with their emphasis on democratic governance, find it difficult to compete because of the challenges in scaling democratic governance. The use of decentralised autonomous design could allow to reduce the reliance on agency in a big organisation. Governance of a cooperative as a DAO can limit the agency involvement in cooperative decision-making with the growth of the organisation.

At the same time, having a decentralised organisation established as a cooperative helps to address some of the significant challenges that DAOs face. First, it provides a legal anchor that allows the organisation to engage in off-chain relations and shields DAO participants from unlimited liability for the actions of the company. Second, it strengthens the decentralisation in a DAO. The rules of code are more rigid than a company's bylaws and do not offer the same operational flexibility. DAOs need design solutions that will prevent the centralisation of

¹⁰⁶ Section 17-31-111(a)(1) of the Wyoming Limited Liability Company Act. However, the act also allows DAOs to regulate membership interests and voting differently in the articles of organisation.

company governance and limit the possibilities for its exploitation. These solutions strongly align with the combination of principles that form the core of a traditional cooperative identity: upon joining, members contribute equitably to the organisation, but the capital investment does not determine their governance rights; instead, members vote with reputation tokens that they receive for contributing to the goals of the organisation. The reputation tokens, not the capital investment, determine the share of surplus that the member will receive from the organisation. Finally, value depreciation of reputation tokens unused in governance motivates members to be active in the decision-making of the company.