AN ALTERNATIVE DAO-BASED FINANCING STRATEGY FOR MICROENTERPRISES: INTERNATIONAL INSIGHTS FROM JAPAN

by

Yoshiyuki Oba, Executive MBA

DISSERTATION

Presented to the Swiss School of Business and Management Geneva

In Partial Fulfillment

Of the Requirements

For the Degree

DOCTOR OF BUSINESS ADMINISTRATION

SWISS SCHOOL OF BUSINESS AND MANAGEMENT GENEVA

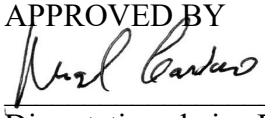
SEPTEMBER 2025

AN ALTERNATIVE DAO-BASED FINANCING STRATEGY FOR MICROENTERPRISES: INTERNATIONAL INSIGHTS FROM JAPAN

by

Yoshiyuki Oba

APPROVED BY



Dissertation chair - Dr. Gualdino Cardoso

RECEIVED/APPROVED BY:

Admissions Director

Dedication

I dedicate this work to all MSME stakeholders—MSME business owners, entrepreneurs, bankers, angel investors, venture capital (VC) investors, and policymakers—with whom I have had the privilege to collaborate in the field of startup and MSME banking worldwide over the past thirty years.

Acknowledgements

I would like to express my deepest gratitude to my supervisor, Professor Giovanni Calice, for his invaluable guidance, support, and encouragement throughout the course of this study. My gratitude also goes to Dr. Gualdino Miguel Cardoso and Dr. Vasiliki Grougiou on my dissertation committee for their insightful feedback and support.

I also appreciate the support and advice from Japan DAO Association, which realized this Japanese case study and gave me practical insights on DAO management, financing, and its operational challenges in Japan.

Finally, I wish to express my deepest gratitude to my wife for her patience, encouragement, and unwavering support throughout the course of this doctoral journey.

ABSTRACT

AN ALTERNATIVE DAO-BASED FINANCING STRATEGY FOR MICROENTERPRISES: INTERNATIOANL INSIGHTS FROM JAPAN

Yoshiyuki Oba

2025

Dissertation Chair: Dr. Gualdino Miguel Cardoso

This dissertation examines the potential of Decentralized Autonomous Organizations (DAOs) as an alternative financing model for microenterprises, with a specific focus on pioneering cases of Japanese microenterprises. Microenterprises worldwide face persistent financing constraints, often relying solely on bank loans under asymmetric information and limited collateral. Against this backdrop, blockchain-enabled DAOs offer novel possibilities for transparency, collective governance, and innovative capital formation mechanisms that may complement conventional MSME finance.

The study employs a qualitative design, integrating a systematic literature review with nine case studies of Japanese DAO LLCs. Semi-structured interviews with these DAO founders, combined with secondary sources such as governance documents and community publications, provided the empirical foundation.

Findings reveal recurring success factors—including community engagement, transparent governance, and access to decentralized finance (DeFi) platforms—while also highlighting major challenges in treasury management, regulatory ambiguity, and sustainable business modeling. Cross-case analysis demonstrates that DAOs can mitigate trust and resource mobilization issues but remain constrained by legal uncertainty and operational immaturity.

Beyond national relevance, the Japanese DAO experience holds international significance. Japan represents one of the jurisdictions to integrate blockchain-based DAOs into existing company law, providing a unique laboratory for global policy and practice. Lessons from Japanese MSMEs are particularly relevant for emerging economies, where MSMEs often face severe financing gaps. DAOs, if properly regulated, may serve as complementary mechanisms to enhance financial inclusion and resilience in local MSME ecosystems.

The dissertation contributes theoretically to the field of MSME finance by extending concepts of relationship banking and credit assessment into decentralized governance environments. It shows how DAO mechanisms can complement existing theories of MSME finance, alleviating information asymmetry as the key issue and offering a hybrid financing model that integrates community-based trust with blockchain-enabled transparency.

In conclusion, DAOs present a promising yet still nascent pathway for supporting microenterprises. Practical implications include the need for regulatory clarity, institutional experimentation, and closer integration with community banking models.

Future research should pursue longitudinal studies tracking the Japanese DAO LLCs with quantitative analysis, as well as comparative case studies across different jurisdictions.

Keywords: Alternative Financing Strategy; Blockchain; Decentralized Autonomous Organization (DAO); Emerging Economies; Information Asymmetry; Japan; Microenterprises, MSME Finance

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

Abbreviation	**Description**
API	Application Programming Interface
CAPEX	Capital Expenditure
DAO	Decentralized Autonomous Organization
DeFi	Decentralized Finance
DLT	Distributed Ledger Technology
DX	Digital Transformation
FCF	Free Cash Flow
FinTech	Financial Technology
ICO	Initial Coin Offering
JSC	Joint-stock company
KYC	Know Your Customer
LLC	Limited Liability Company
MSME	Micro, Small, and Medium-sized Enterprise
NFT	Non-Fungible Token
P2P	Peer-to-Peer
PSD2	Second Payment Services Directive
SCF	Supply Chain Finance
SME	Small and Medium-sized Enterprise
TPP	Third-Party Provider

CHAPTER I:
INTRODUCTION

1.1 Background

Following Vermont's legal recognition of blockchain-based limited liability companies (BBLLCs) in 2018, the legal framework for Decentralized Autonomous Organization Limited Liability Companies (DAO LLCs) with legal personality was first introduced in the United States (U.S.) with Wyoming Senate Bill 38 (the DAOs Supplement) of the U.S., effective July 2021 (UK Law Commission, 2022). Between November 2022 and January 2023, the UK Law Commission conducted a call for evidence, soliciting input from users and experts regarding the characterization of DAOs and the potential legal frameworks within England and Wales to accommodate them (UK Law Commission, 2022). The document entitled *DAOs Call for Evidence* (2022) published by the commission presented a view on DAO-specific incorporations:

> We understand that DAO-specific incorporations may not be attractive to all DAOs for practical, legal or ideological reasons, especially those that wish to maintain or increase their degree of decentralization. However, we also understand that other stakeholders might find a use for these entities: for instance, if they wish to set up a simple DAO and immediately benefit from limited liability; or if they wish to incorporate a limited liability sub-DAO as part of a more complex DAO organizational structure. (UK Law Commission, 2022, p. 48)

This movement has globally sparked discussions on DAO-enabled governance with decentralized organizational structure and transparency for businesses, and direct financing mechanisms such as DAO tokens and Initial DEX offerings (IDOs), as well as Decentralized Finance (DeFi) (Digital Agency of Japan, 2022). In Japan, for instance, DAO LLCs received recognition by the Cabinet Office Ordinance on Definitions under

Article 2 of the Financial Instruments and Exchange Act, Japan, effective April 2024. This has led to growing interest in DAOs not only for non-profit organizations but also for profit-oriented businesses in Japan. In contract to the typical adoption of DAOs in social contribution initiatives and fund management, several ordinary microenterprises and startups in Japan—including winemaker, restaurant, hotel, app developer, and real estate agent—have started experimenting with DAOs to boost crowdfunding and expand market reach (Gaiax Co. Ltd., 2025, 2024). Within the DAO-related communities in Japan, the recent trend raises questions about whether micro, small, and medium-sized enterprises (MSMEs) adopting DAOs share similar improvements in business philosophy, transparency, scalability, and operational efficiency, as well as token-based crowdfunding (Digital Agency of Japan, 2023; Japan DAO Association, 2025a).

Despite the recent advancement of FinTech and DeFi solutions aimed at addressing key issues in MSME lending, such as information asymmetry and high transaction costs for lenders, MSME finance remains one of the major policy challenges around the world. Thus, many governments have still played a key role in offering both financial and non-financial support, as well as improving the regulatory environment for sustainable financing of the MSME sector. For instance, the Japanese government has offered financial support to MSMEs in the form of credit guarantees and direct loans. In Japan, as of March 2022, the total amount of outstanding MSME loans is approximately JPY 314 trillion, while the outstanding amount of the public credit guarantee program is JPY 41.9 trillion (covering 1.58 million MSMEs) and the outstanding amount of the government's direct loan program is JPY 29.8 trillion (covering 1.33 million of Japan's 3.58 million MSMEs). (OECD, 2024)

In particular, in contrast with high-growth startups receiving equity investments, ordinary microenterprises rely exclusively on traditional bank loans for external

financing. Nevertheless, they still face structural barriers when attempting to access bank loans (OECD, 2019). This issue is significant due to the substantial presence of microenterprises in each country's business sector. In Japan there are 2.8 million microenterprises, legally defined as having five employees or fewer (or 20 employees or fewer for manufacturing, hotels, or entertainment), which account for 84.5% of all enterprises, 20.5% of all employees, and 14.5% of the national value added in the country (SME Agency of Japan, 2024).

Given the financial access challenges for these ordinary microenterprises and DAO's significant potential to improve management transparency and mitigate information asymmetry in MSME finance, a pertinent question arises: how can DAO help ordinary microenterprises get better financial access?

1.2 Research Problem

Despite the unresolved financial access issues for ordinary microenterprises and the potential benefits of DAO for them, no study has attempted a comprehensive examination of how DAOs specifically affect microenterprises' access to financial services, including both direct finance (e.g. token-based crowdfunding, equity investment, convertible notes) and indirect finance (e.g. bank overdrafts, mid-to-long-term bank loans, lending-based crowdfunding). In particular, little attention has been paid to the impact of DAO-driven managerial competencies on access to bank loans, which typically has information asymmetry and the resulting collateral shortage problems for microenterprises.

1.3 Purpose of the Research

This study is intended as an investigation of how DAO may improve microenterprise financial access and eventually an exploration of the potential of DAOs to serve as an alternative financing strategy for microenterprises.

1.4 Significance of the Research

Although prior studies have discussed blockchain-enabled governance and financing within small and medium-sized enterprises (SMEs) and the impact of DAOs on business management, a comprehensive analysis of DAO's impact on microenterprise financial access remains absent. The results of this study provide a significant academic contribution by addressing such a research gap at the intersection of DAO adoption and financial access for microenterprises.

In practical terms, by analyzing the managerial and financial benefits that DAOs can offer to microenterprises, this study attempts to prove beneficial to microenterprises in their pursuit of better financial access, and eventually contributes to the literature in multiple ways: i) bridging the gap in the 'MSME finance' studies: this study is the first to explore how DAO transformation or integration improves microenterprise financial access by reducing information asymmetry as the key issue in MSME finance; ii) expanding the understanding of DAO management among microenterprises around the world: by analyzing how DAO-driven managerial competencies impact microenterprise management and financing, this study offers insights into novel governance structures for microenterprises worldwide; and iii) introducing an alternative financing strategy for microenterprises: this study proposes a hybrid financing model, combining traditional loans with DAO-enabled funding mechanisms, providing an innovative framework for future microenterprise financing. Furthermore, the findings offer valuable policy

recommendations for MSME stakeholders, including government agencies and financial institutions in any countries facing MSME financial access challenges.

These contributions should be significant, particularly in emerging economies characterized by underdeveloped financial ecosystems and relatively low adoption of FinTech into MSME lending practice. In these emerging economies, there are 162 million formal MSMEs, of which 141 million are microenterprises. There is an MSME finance gap of USD 5.2 trillion, equivalent to 19% of these economies' cumulative GDP and 59% of the potential demand for these MSMEs (cf. According to the recent data in 2025, the MSME finance gap in 2019 is USD 5.7 trillion, equivalent to 19% of GDP and 59% of the potential demand). This MSME finance gap includes a microenterprise finance gap of USD 718.8 billion, equivalent to 81% of the potential demand for microenterprises. This statistical data follows the IFC's definition of MSMEs: microenterprises are defined as businesses with fewer than 10 employees, total assets of less than USD 100,000, or annual sales of less than USD 100,000. (International Finance Corporation, 2017)

1.5 Research Objective and Questions

To explore the potential of DAO as an alternative financing strategy for microenterprises, the objective of this study is to conduct a systematic review of relevant literature on the impact of DAOs on microenterprise management and financial access, and a Japanese case study, with the following five sub-objectives:

(1) To clarify the definitions of DAO and its nature.

(2) To analyze the impact of DAO on microenterprise management.

(3) To review the banking method for assessing the credit risk of microenterprises.

(4) To analyze the impact of DAO on financial access for microenterprises.

(5) To develop an alternative financing strategy for microenterprises through DAOs.

Regarding the rationale behind choosing a Japanese case, this case study focuses mainly on Japan's DAO LLC framework, which represents one of the legal recognitions of DAOs as incorporated entities worldwide. In Japan, there have been over 200 DAOs with social missions, commercial purposes, or both (Gaiax Co. Ltd., 2024), while policy discussions on how to promote DAOs for the MSME sector and regional economic development are continuing (Digital Agency of Japan, 2023). This institutional and practical experiment provides not only a valuable case for understanding the evolution of digital organizational forms, but also a potential model for addressing persistent financing challenges of microenterprises, a sector often underserved by conventional banking systems. This also may be a valid reference case for the governments of numerous countries facing MSME financial access challenges.

In this study, to determine if the enhanced microenterprises' competencies aligning with a DAO may improve their financial access, the following five research questions (RQs) need to be addressed.

RQ1: What are the definitions of DAO and its nature?

RQ2: How does DAO affect microenterprise management?

RQ3: What are the methods used by banks to assess the credit risk of microenterprises?

RQ4: How can DAO help microenterprises improve financial access?

RQ5: What is an alternative financing strategy for microenterprises through DAOs?

In order to address these research questions, it is necessary to build on existing theories and prior studies to establish a solid analytical foundation. The following chapter therefore reviews the relevant literature on DAOs, blockchain, and MSME management and finance theories.

1.6 Structure of the Thesis

This thesis is structured in six chapters.

- Chapter I introduces the study background, objective, and research questions, establishing the rationale for studying DAOs as an alternative financing mechanism for microenterprises.
- Chapter II reviews the relevant literature on DAOs, blockchain, MSME management and finance theories, identifying research gaps and building the conceptual framework.
- Chapter III explains the research methodology, including the case study design, data collection, and analytical approaches.
- Chapter IV presents the empirical results from nine case studies of Japanese DAO LLCs, focusing on their organizational characteristics, financing practices, and management challenges.
- Chapter V discusses the findings in relation to the research questions and the literature, highlighting both consistencies and discrepancies, and drawing out the theoretical and practical implications.
- Chapter VI concludes the thesis by synthesizing the key insights, outlining contributions to literature and practice, addressing the research's limitations, and offering recommendations for future research.

CHAPTER II:
REVIEW OF LITERATURE

2.1 Theoretical Framework

This literature review starts with a basic theory of SME finance — that the major issues of SME finance lie in 'information asymmetry' and 'relatively high transaction costs' for lenders. As discussed by Yabushita and Bushimata (2002), information asymmetries are unavoidable because it is difficult for lenders to understand borrowers' information at the same level as borrowers, and borrowers provide as little adverse information about their financing as possible. It is costly for lenders to capture borrower information accurately from screening to monitoring. Because of this, 'economies of scale' come into play regarding such financial transaction costs. Smaller SME loans may mean higher relative screening and monitoring costs for lenders, which may disadvantage smaller SMEs regardless of strong performance. This leads to difficulties in accessing finance for SMEs.

The literature review categorizes prior studies based on: i) the solutions to these fundamental issues for lenders and microenterprises (blockchain or DAO); ii) the form of business entity (blockchain-enabled business, business transforming into a DAO, or business integrating with a DAO); iii) business size (microenterprises or SMEs); and iv) the impact of these solutions on managerial competencies and financial access.

By adopting such a theoretical framework, the literature review clarifies the research gaps as shown in Table 2.1 below. Despite the growing interest in DAO utilization for MSMEs, no comprehensive study has specifically examined the impact of DAO on MSME financial access. However, given the social and economic importance of microenterprises and their funding difficulties all over the world, the scope of this study

is specifically narrowed to the impact of DAO transformation or integration on microenterprise financial access, as highlighted (shadowed column) in Table 2.1 below.

Table 2.1
Theoretical Framework for the Literature Review

The problem	Financial gaps for microenterprises, particularly in emerging economies ++++					
Root causes	i) Relatively high transaction costs		ii) Information asymmetry (and resulting collateral shortage problems)			
Solutions for financiers	FinTech, DeFi, ventureDAO ++++++++++++ ++++++++++		'Relationship Lending', SME credit scoring, 'Community Banking', 'Open Banking' ++++++++++++++++++++++++++ ++++++++++++++++++++++++++			
Solutions for microenterprises	Use of digital accounting services and efficient reporting to financiers. Plus, adopting disruptive technologies and entity form for better financial access?					
	Blockchain		DAO (definitions and nature +++++, DAOs in Japan +++++++)			
Form of business entity	Blockchain-enabled business		Business transforming into a DAO		Business integrating with a DAO in parallel	
Focused business size	Micro	SME	Micro	SME	Micro	SME
Impact on:						
Managerial competencies	++++		++++++++++++++++		n/a	n/a
Financial access	n/a		n/a	n/a	n/a	n/a

Note: The symbol '+' denotes the number of main literature sources reviewed in this study.
Source: Developed by the author based on a review of relevant literature

2.2 Inclusion Criteria

The literature in this review is selected based on the following specific inclusion criteria. Considering that there have been discussions on the research topic since the introduction of the first legal framework for DAO LLCs in the U.S. in July 2021, peer-reviewed articles and high-quality journals published between 2020 and 2025 are retrieved from Google Scholar, ResearchGate, arXiv, EBSCO, Emerald Insight, CERN Document Server, Consensus, Elicit, and SciSpace, using keywords such as 'DAO', 'blockchain', 'microenterprise', 'MSME', 'governance', 'financial access', 'SME credit risk assessment', 'SME credit scoring', 'relationship lending', 'community banking', 'open banking', 'DeFi', and 'ventureDAO', individually or in combination. Research

papers without empirical evidence or sufficient citations are excluded from the literature review. Prior studies are also excluded unless they are English or Japanese.

Furthermore, to avoid proposing unrealistic financing strategies and policy recommendations for MSME stakeholders, the literature review focuses on the real practice of DAOs through reviewing grey literature (webpages, social media, group communication tools such as Discord, Slack, Notion). The main sources of this grey literature come from: Japan DAO Association (Tokyo, Japan), Metagov (the metaverse), Palo Alto De-Sci Research Lab (Palo Alto, US), Crypto Valley Association (Zug, Switzerland), DeepDAO (Tel-Aviv, Israel), Gaiax Co. Ltd. (Tokyo, Japan), F6S (London, UK), and other sources.

2.3 Clear Organizing Themes

To examine how DAO may help microenterprises improve financial access and explore an alternative financing strategy for microenterprises through DAOs, this literature review is guided by the five research questions (RQs). The literature review approach, process, and outcomes are illustrated in Figure 2.1 below.

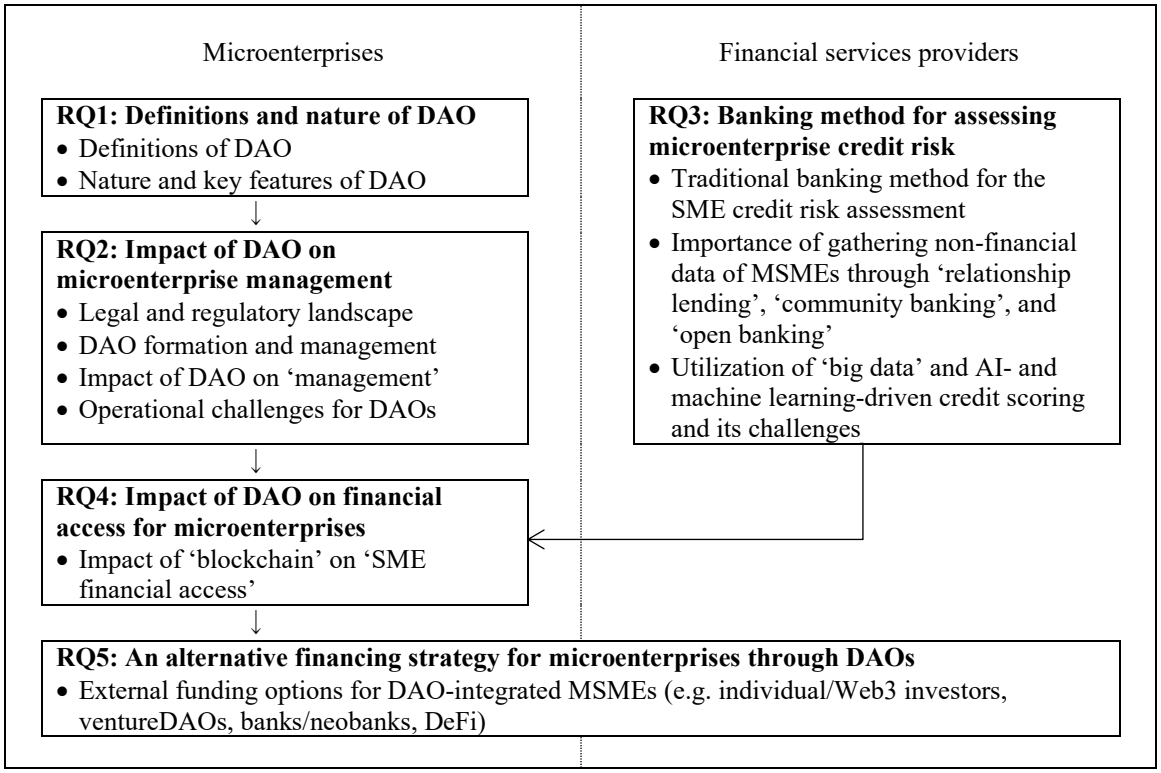


Figure 2.1
Literature Review Approach, Process, and Outcomes
Source: Author's own compilation

2.3.1 Definitions and Nature of DAO

The pioneering blockchain organization 'The DAO' was first founded in 2016. This investment project employed Ethereum as its native digital currency, with its aims and operational protocols immutably inscribed on the Ethereum blockchain (Brzezinski, 2023). Its goal was to create a digital, collaborative peer-to-peer (P2P) community of investors and entrepreneurs, building a crowdfunding network to further develop the Ethereum ecosystem with new organizations (Santana and Albareda, 2022).

Historically, DAOs emergence of DAOs responded to a long-standing tradition of exploring decentralized organizations. The internet's growth has fueled experimentation with decentralization through open-access communities and open-source software. These

digital platforms have transformed the way digital businesses organize and create value with contributors and customers while working and exchanging resources in the digital space. (Santana and Albareda, 2022)

From a technological viewpoint, blockchain was crucial to the creation of the first DAO. Blockchain is a technological innovation that appeared in 2009 as a proposal submitted by S. Nakamoto. This technology is a decentralized, public cryptographic network with millions of nodes chronologically recording events. Its high security is a result of the interconnectedness of these records. With contracts on the Ethereum blockchain, this technology is described as revolutionary and groundbreaking. Smart contracts replace contracts whose performance or violation depends on the parties' will with the ‘law of code’, where the algorithm automatically and relentlessly executes the provisions. (Brzezinski, 2023)

Despite the failure of the first DAO, numerous DAOs have emerged, such as DAOstack, DAOhaus, Moloch DAO, Uniswap, BitDAO, Mango DAO, Compound, Radicle, Maker DAO, Decentraland, Aragon, and others. According to DeepDAO (2025), the total market value of DAOs that DeepDAO, a well-known DAO statistics platform, manages is $16.9 billion with 50,845 DAOs (including 2,461 DAOs enriched by DeepDAO) and 11.8 million tokenholders around the world.

Regarding the definition of DAO, Santana and Albareda (2022) compile selected definitions by ten other researchers and eventually define a DAO as “blockchain-based organizations fed by virtual open networks of contributors (investors in cryptocurrencies). Their governance and management are decentralized without central control and are built on automated rules encoded in smart contracts stored and executed in blockchains” (Santana and Albareda, 2022, pp. 1–2).

Nevertheless, the term DAO broadly denotes a novel online organizational structure governed by algorithmically encoded regulations. DAOs vary significantly in their legal structure, organization, size, regulations, and objectives. The market is marked by a continuing discussion and divergence of views regarding the terminology and constituent elements of a DAO. (UK Law Commission, 2024)

Apart from the definitional issue, prior studies have explored common DAO features using various theoretical frameworks. For instance, first, Santana and Albareda (2022) posit three DAO principles: i) decentralization; ii) automated; and iii) autonomous. The attributes of DAOs are highlighted using this framework, as detailed below.

Decentralization: DAOs enable digital joint self-organized communities to cooperate on shared goals without any formal management hierarchy, centralized control, or even third-party intervention and supervision. Consequently, DAOs cultivate a digital, P2P community of contributors assuming various roles and executing automated tasks essential to the organization's operation. DAOs do not have executive boards and CEOs who decide for everyone else; rather, the entire P2P community of contributors proposes, votes, and decides. DAOs empower all members to participate in collective decision-making and investments. These automated tasks in DAOs are based on DAO smart contracts and are encoded in the blockchain protocol.

Automated: DAOs utilize smart contracts on blockchain protocols to automate their operations. Smart contracts are programmable agreements based on computer code, also known as the ‘code-is-law’ principle or ‘law code’. Smart contracts let automated rules run DAOs without central oversight, managing ownership, transactions, and communication between contributors. These encoded rules facilitate clear interactions, transparency, and distributed trust between DAO contributors. The DAO organizational

shifts are due to the technological developments that make up blockchain architecture such as distributed ledger technology (DLT), machine consensus mechanisms, Artificial Intelligence (AI)-based intelligent matching, and other ongoing technological development (e.g.AI, Big Data, the Internet of Things).

Autonomous: DAOs operate through the active participation of a P2P community of contributors, using off-chain democratic rules and direct voting processes based on transparency and token incentives instead of bureaucratic systems. In doing so, DAOs combine machine and human governance. Machine governance is based on on-chain encoded and automated tasks in smart contracts. Human governance is enhanced by off-chain systems, allowing contributors to discuss proposals via social media and online forums, submit proposals, vote, and trigger community decisions. DAOs, as autonomous organizations, are driven by tokens. Tokens represent the 'negotiable digital assets and the proof of rights and interests' of each DAO investor-contributor. The credibility and influence of DAO members are reflected in their token exchanges, forming the DAO's reputation system.

Santana and Albareda (2022) also indicate that the emergence of blockchain and DAOs has been studied through four theoretical perspectives listed in Table 2.2: i) transaction cost theory; ii) theory of institutions for collective action; iii) agency theory; and iv) sociomateriality theory. These theories explain how DAOs reduce uncertainty and transaction costs for P2P transactions, enable collective action through community-driven rules, and offer a new approach to principal-agent relations by automating the agent. The table also describes how DAOs' social and material elements combine to create new organizational designs that allow P2P communities to operate without human intervention.

Table 2.2
Theoretical Perspectives Applied to DAOs and Blockchain

Types of theory	Transaction cost theory	Theory of institutions for collective action	Agency theory	Sociomateriality theory
Approach	DAOs reduce uncertainty and opportunism among investors by proposing a complete contracting model. They reduce transaction costs related to economic coordination by delivering an alternative form of disintermediate economic governance for P2P transactions.	DAOs work with the principles of collective action by which virtual community members adopt collective choice arrangements to design, discuss, and vote on the rules governing the software protocols and verify the exchange of shared resources.	DAOs introduce a different approach to principal–agent relations because the agent is automated by the cooperation of a distributed network of computers. They reduce the agent's problem of self-interest, which leads to the agency conflict of moral hazard.	DAOs' social and material agencies become interlocked and produce new forms of organizational design that enable P2P communities to act without human intervention. DAOs' sociomateriality includes: i) sociomaterial practices and interaction; ii) human–machine agency; and iii) institutional change.

Source: Adapted from Santana and Albareda (2022, p. 7), modified by the author

Second, Rikken et al. (2023) define the categories of DAO characteristics: i) functional characteristics; ii) governance characteristics; iii) technical characteristics; and iv) other characteristics. Table 2.3 presents these four categories of DAO's characteristics, including key features such as notary function for decision-making; autonomous decision-making; fully transparent organization and its code; stakeholders' consensus by voting based on predetermined voting rules; smart contract; and autonomous execution.

Table 2.3
Four Categories of DAO Characteristics

Functional characteristics: • (Conditional) storage and transfer of value: The storage and transfer of value in these cases are always in the form of cryptocurrencies. • Notary function for decision-making: This functionality refers to the element of being able to organize, track, and archive voting. This is typically where a DAO differs from any multisig application.
Governance characteristics: • Decentralized on the infrastructure level: Functional and rules are coded on blockchain (no one entity can stop infra). • Decentralized on the application level: not in the hands of a single person/party that can make all the decision. • Autonomous decision-making: fully autonomous decision-making based on information presented. • The organization and its code are fully transparent. • Stakeholders reach consensus on decision by voting based on predetermined voting rules (majority, quorum, and no hierarchy) • Updates, bugs, and optimizations need democratic voting and decision-making by share/tokenholders. • The decision-making process always starts with a proposal or external trigger. • Voting rights could be distributed either based on the number of token owned or evenly.
Technical characteristics: • Smart contract code: This characteristic is described various times in different literature. There are multiple blockchain protocols (not applications often called protocols, like DeFi solutions call themselves) that consider themselves DAOs as well. • The code is open source. • Is (public) blockchain-based?
Other characteristics: • Operational: Two main characteristics • Autonomous execution: A DAO acts and executes independently (not external or human-influenced) after triggers/decisions. • DAO 'hires' externals for operational work based on shareholders' decisions (no employees). • Legal: Has a certain legal status or at least clear governance with regards to responsibilities and accountabilities.

Source: Rikken et al. (2023, p. 6)

Finally, UK Law Commission (2024) lists key DAO features: i) decentralization and autonomy; ii) DLT and smart contracts; iii) governance (i.e. decision-making by community voting, including original developers of the DAO with tokens, rather than a centralized authority or management team); iv) various participants such as software developers, tokenholders, investors/shareholders, operators/contributors, customers/clients; and v) direct funding.

Summing up, despite the continuing discussion and divergence of DAO's terminology, prior studies have explored the nature of DAO through focusing on the key blockchain-enabled features on governance with various stakeholders, such as decentralization; automation (with smart contracts); autonomy (by community voting); fully transparent organization; and token-based direct finance.

2.3.2 Impact of DAO on Microenterprise Management

DAOs may choose to adopt traditional, legally recognized organizational structures, such as limited companies, partnership models, offshore funds, or DAO-specific legal entities (UK Law Commission, 2024). The DAO forms, including Decentralized Autonomous Corporation (DAC), Decentralized Autonomous Initial Coin Offering (DAICO), Decentralized Autonomous Co-Operative (DACO), Limited Liability Autonomous Organization (LLAO), and Decentralized Party (DP), all make use of the overall concepts of DAOs (Rikken et al., 2023). Among the various DAO forms, this study focuses mainly on microenterprise management transforming into or integrating with an LLAO or a DAO LLC, a recent generation of DAO with legal personality, where the Ethereum environment may be typically bridged to traditional business regimes.

The first regulation on DAO LLCs is Wyoming Senate Bill 38 (the DAOs Supplement) of the U.S. This legal document outlines the organizational structure and administration of DAO LLCs (see Table 2.4), serving as a benchmark for DAO legal frameworks in recently adopting jurisdictions such as Japan (Digital Agency of Japan, 2022).

Table 2.4
Summary of DAO Law in the U.S. State of Wyoming (2021)

Position of the DAO Act	• The so-called DAO Act refers to regulations related to DAOs based on Chapter 31, which were newly created in Title 17 of the Wyoming State Law. • In the DAO Act, a 'DAO' is defined as a 'limited liability company incorporated based on the provisions in this chapter'. • The DAO Act is positioned as a special provision attached to the limited liability company law of the State of Wyoming, and said law is applied to DAOs to the extent consistent with the provisions of the DAO Act.
Requirements for incorporating DAOs	• The requirements for incorporating DAOs based on the DAO Act are stipulated in Title 17, Chapter 31, Article 104 onwards of the Wyoming State Law. For example, it requires DAOs to include the following matters in the articles of incorporation: 1. that it is a DAO; 2. fixed phrases to the effect that DAOs may be, unlike regular limited liability companies, subject to certain restrictions, such as fiduciary duty of equity holders, disposal of rights held, and withdrawal; 3. smart contract identifier directly used for management, promotion, and operation of the DAO; 4. matters related to how participants operate the DAO, including to what extent the DAO will be operated in accordance with the algorithm; and 5. matters related to the DAO, such as rights and obligations of the participants, details of activities of the DAO, dividends paid before withdrawal or dissolution, and changes to the articles of incorporation. • It is required to include 'DAO', 'LAO', or 'DAO LLC' in the name of the DAO. • A DAO can be incorporated by submitting the articles of incorporation to the Secretary of State and with only one member.
Registration procedures for DAOs	• In order to register a DAO as a corporation, it is required to input and submit necessary information online or use a paper form. • The registrant may not necessarily be a resident of the State of Wyoming, but to register a DAO, a registered agent who meets certain requirements including having an address in the State of Wyoming is required. • It is not permitted to register a DAO of foreign country as a DAO under the DAO Act.
Rights and obligations of Members	• While members bear duty of good faith, they are not subject to fiduciary duty. • Members do not have the right to request permission to inspect financial and other documents, as long as such documents are published on an open blockchain.
Withdrawal of members	• The conditions and procedures related to withdrawal of members are stipulated in either the articles of incorporation, smart contract or operation contract. • If there are no special provisions in the foregoing, a member will withdraw from the DAO when they transferred all property underlying their equity interest, voting right, or economic right
Dissolution of DAOs	• The reasons for dissolution of DAOs shall be as follows: 1. when the duration of the DAO expires; 2. when a resolution for the dissolution has been passed by the majority vote of the members; 3. when a reason for dissolution stipulated in the smart contract, articles of incorporation or operation contract has occurred; 4. when the DAO approved no proposal or conducted no activities for a period of one year; 5. when the DAO ceased to have a legitimate business purpose or there is no longer a single natural person member; 6. when all of the members of the DAO have withdrawn.

Source: Digital Agency of Japan (2022, p. 61), official English translation (2022, pp. 82–83)

Following the initial legal recognition of BBLLCs in Vermont (2018) and the first regulation of DAO LLCs in Wyoming (2021), Tennessee (DAO LLC, 2022) and Utah state (LLD, 2023) within the U.S., as well as the Marshall Islands (2022), have enacted relevant laws and regulations for DAOs with limited liability (BlockStand and de la Roche W. Consulting, 2025).

However, the legal and regulatory landscape for DAOs varies significantly across jurisdictions, with different countries and regions. New Hampshire (the U.S.) passed DAO Law (House Bill 645-FN, 2024) for a blockchain-native DAO registration system. The Principality of Liechtenstein was the first country in the world to comprehensively regulate the token economy with a blockchain law known as the Token and Trusted Technology Service Providers Act (TVTG) (2020). The TVTG is based on the 'Token Container Model' and stipulates that tokens can legally 'house' any asset or right. This bridges the gap between the physical and digital worlds and clearly defines on-chain rights. Although the TVTG does not create a DAO LLC, it provides a legal basis for DAOs to use existing legal entities, such as the Liechtenstein Foundation (Stiftung) or associations.

Some countries have taken the approach of utilizing the existing corporate form as 'legal wrapper' for the DAO. This approach provides a quick means of giving legal substance to a DAO without having to await new laws. For example, the Cayman Islands has legally recognized DAOs as ownerless 'foundation companies' under the Foundation Company Act, while Panama has taken 'private interest foundation' model for establishing a legal shield to DAO members with unlimited liability. Abu Dhabi has developed 'DLT foundation' under the Abu Dhabi Global Market regulations. The Principality of Liechtenstein has adopted 'Token Container Model' under the Token and

Trustworthy Technology Service Provider Act (TVTG) 2021, which gives DAOs legal personality. (BlockStand and de la Roche W. Consulting, 2025)

'Legal wrappers' also include the British Virgin Islands business company (BC) or company limited by guarantee; Singapore private limited company (Pte Ltd) or company limited by guarantee (CLG); Malta private limited company (PLC) or foundation; Estonia private limited company (OÜ); the United Arab Emirates DAO association or company limited by guarantee; and the United Kingdom LLC, community interest company (CIC), or cooperative (BlockStand and de la Roche W. Consulting, 2025).

Notably in Switzerland, the legal recognition of DAOs (as limited liability 'Verein' [i.e. Association]) is approached through private international law. The Swiss legal system accepts foreign DAOs under other jurisdictions' laws with minimal legal problems. However, DAOs that operate independently of any jurisdiction pose challenges to existing legal principles. Some scholars propose treating DAOs as foreign companies under international law, letting them operate as they do now, but within the Swiss law. This approach is complemented by the concept of 'functional equivalence', which treats the code of a DAO as its governing law and the online space as its jurisdiction. (Riva, 2019)

In Japan, there have been no system to grant juridical personality specifically to the organizational form of DAO itself, and there are many unclear points such as governing law, legal position, contents of legal rights and obligations of members and participants, taxation, and other matters. (Digital Agency of Japan, 2022). Nevertheless, the Cabinet Office Ordinance on Definitions under Article 2 of the Financial Instruments and Exchange Act, Japan, effective April 2024, was intended to strengthen investor protection by making tokenized LLC memberships subject to regulation under the

Financial Instruments and Exchange Act. Uwaizumi (2024) explained in his lecture at the NEC-sponsored Web3 Community Roundtable Discussion in October 2024: “This amendment to the act allows: i) the creation and sale of Non-Fungible Tokens (NFTs) for DAO LLC member rights; ii) the offering of the member rights, and iii) the registration of an LLC under DAO-type articles of incorporation” (Uwaizumi, 2024, author’s translation). The Japan DAO Association has published a guideline of DAO LLCs in April 2024 (Japan DAO Association, 2025a).

Globally, the DAO-related regulatory landscape reveals at least 18 jurisdictions permitting DAO LLCs or similar legal entities, including Vermont; Wyoming; Tennessee; Utah; and New Hampshire (U.S. states); the Marshall Islands; the Principality of Liechtenstein; the Cayman Islands; Panama; the British Virgin Islands; Singapore; Malta; Estonia; the United Arab Emirates; Abu Dhabi; the United Kingdom; Switzerland; and Japan.

Given the DAO-related regulatory landscape in the world, one of the primary challenges facing DAOs is legal uncertainty. In practical terms, Boss (2023) reports that the experts wish to have legal clarification or a legal framework for such subfields as tax, treasury and tokens, employment relations, dispute resolution, securities qualification, limited liability/legal personality, forking, voting, use of smart contracts, dissolution, disclaimer, and fiduciary status. Her research paper contains recommendations on these topics based on provisions from *COALA Model Law for DAOs*, DAO-specific legislation in the U.S. states of Vermont, Wyoming, Tennessee, Utah, and New Hampshire. This model law aims to create uniformity and legal certainty, while accommodating flexibility for innovation by not imposing formal registration requirements, as shown in Table 2.5 (Coalition of Automated Legal Applications (coala), 2021).

Table 2.5
Structure of the Model Law for DAOs

Contents	Remarks
Chapter 1. General Provisions Article 1. Nature Article 2. Legal Personality Article 3. Definitions	Chapter 1 sets out the broad range of economic and social activities that DAOs can engage in, the rights and obligations that DAOs can enjoy as a separate legal person, and important definitions used in the Model Law (ML).
Chapter 2. Formation and Proof of Existence Article 4. Formation Requirements	Chapter 2 sets out the eleven technical and governance requirements that a DAO needs to meet to benefit from legal personality, and for its Members to receive limited liability person.
Chapter 3. Limited Liability, Asset Subscription and Members' Rights Article 5. Limited Liability Article 6. Asset Subscription and Payment Article 7. Classes of Persons Participating in the DAO Article 8. Voting Rights Article 9. Proxies Article 10. Minority Protection	Chapter 3 sets out the potential actions that may lead to Members forfeiting limited liability protection, namely fraud and failure to comply with binding arbitral awards or court orders. This chapter also clarifies that minimum capital requirements are not mandatory for DAOs. This chapter is devoted to governance rights, providing considerable leeway to DAOs to create multiple classes to protect minorities and appoint proxies.
Chapter 4. Internal Organization and Disclosure Article 11. Internal Organization Article 12. Meetings Article 13. Administrators Article 14. Legal Representation Article 15. No Implicit Fiduciary Status	Chapter 4 builds on the question of how a DAO under the Model Law may be governed. It seeks to allow individual DAOs to have considerable flexibility in how their internal organization and procedures take place, without being bound by the same constraints that a number of corporate entities are subject to (e.g. in-person, physical meetings). The ML enables management by consensus as well as the appointment of Administrator(s). The DAO may need to have representation off-chain for certain purposes and activities.
Chapter 5. DAO Specific Provisions Article 16. Contentious Forks in the Underlying Blockchain Article 17. DAO Restructuring Article 18. Failure Event	Chapter 5 includes specific articles that concern the consequences of Contentious Forks, modifications, upgrades and migrations on the legal personality of a DAO and the limited liability of its Members. There may be Failure Events that are specific to DAOs.
Chapter 6. Miscellaneous Provisions Article 19. Application of General Business Organization Law Article 20. Taxation of DAOs	Chapter 6 includes two important miscellaneous provisions that are necessary in creating a coherently complete legal framework for DAOs, First, it specifies when general business organization law should be applied to DAOs by a jurisdiction that adopts the ML. Second, it establishes the recognition of DAOs as pass-through entities for the tax purposes, so as to simplify the process of taxation for DAOs.

Source: Developed by the author based on Coalition of Automated Legal Applications (coala) (2021)

In Japan, however, useful references such as *the COALA Model Law for DAOs* have not been widespread, although Japan DAO Association has started an awareness

campaign. Thus, there have been several practical challenges regarding DAO implementation as follows (Digital Agency of Japan, 2023):

- Design of governance and incentive mechanisms for DAOs is difficult.
- There are only a few DAO whitepapers in Japan that may be used as references.
- If transactions may not be completed on the blockchain, even if only organizational management is conducted by a DAO, it may not lead to improved efficiency and cost reduction.
- If a DAO is established as a partnership form, it is unclear how to open a bank account for the DAO properly. This is not a DAO-specific issue, but rather an issue when a non-profit organization opens a bank account.
- If a DAO and a joint-stock company (JSC) are to coexist, there are issues to be considered regarding how to design the ratio of shares and governance tokens, as well as the possibility that the system of a joint-stock company will pull the DAO's advantages to the detriment of the DAO itself.
- Although DAO formation itself has a publicity effect as a company, other inherent benefits are not yet realized.

Despite such an uncertain legal landscape for DAOs around the world, prior studies have explored the potential impact of DAOs on various aspects of business management, including trust; business valuation; corporate governance; transparency; adaptability; accountability; efficiency; and predictability.

Morrison et al. (2020) examine the initial case of ‘The DAO’ as an exemplar of a new species of corporate governance, which has various implications for 21st century firms that seek to decentralize their organizations and governance using blockchain and other emerging technologies. This case shows how much trust matters in governance. In

DAOs, trust is distinct from ownership and control, making them a new type of governance.

'The DAO' was designed to be trustless and operated successfully without need of trust, thus raising legitimate questions about the adequacy of current governance theories. The DAO's failure does not invalidate trustless organizations, but rather highlights the challenges that must be solved if trustless organizations are to succeed, and the need to reconsider and expand current governance theories for the role of trust. (Morrison et al., 2020)

Li et al. (2023) thus propose a parallel management framework, i.e. smart organizations and intelligent operations, which relies on the organizational, coordinational and executional (OEC) technologies of DAOs. DAOs utilize technologies such as social computing and crowdsourcing, implementing smart contracts and democratic voting in a trustless environment, enabling stakeholder participation in all stages of decision-making. DAOs consider both hard and soft management factors, using internal and external resources in their approach. Hence, DAOs may secure the participation of nearly all interconnected components crucial in knowledge work for parallel management. The novel DAO-based management paradigm, operating within a parallel management framework, is termed decentralized management.

Küng and Giaglis (2024) explore the relationship between open business models and DAO's business value, as illustrated in Figure 2.2 below. The DAO business framework components harmonize with pre-blockchain, open-source paradigms. Blockchain technology augments transactional trust and transparency, promoting collaborative efforts without intermediaries. DAOs facilitate governance through community decision-making, contrasting with traditional open strategies, where firms interact only outside for knowledge. Exchanging values in blockchain environments

creates new value system mechanisms that attempt to bypass the ‘paradox of openness’. In DAOs, this new medium of exchange is called a token. Tokens enable community participation in organizational transactions, strengthening firm value systems and network effects. Because tokens drive user engagement and company success, their design (types, incentives, supply) needs careful planning. Hence, tokens are vital for DAO business model innovations and are an element in the DAO business framework.

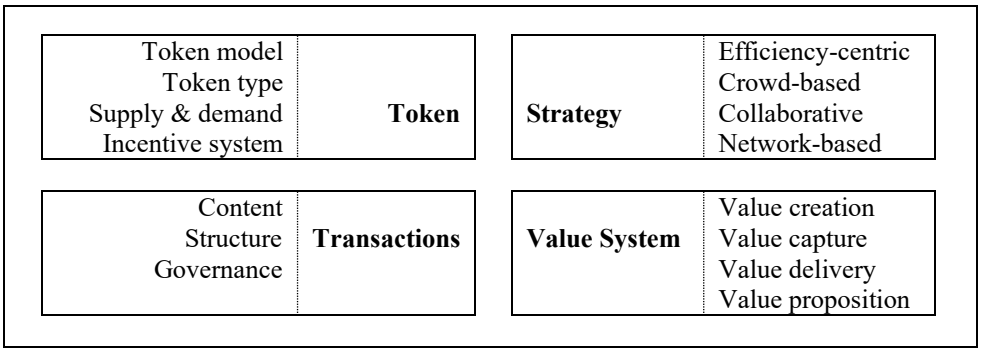


Figure 2.2
DAO Business Framework
Source: Adapted from Küng and Giaglis (2024, p. 8)

Hashemi-Khiabani and Polónia (2023) discuss the differences between traditional governance and DAO-enabled governance. Conventional governance employs a hierarchical decision-making process. Decision-making authority is largely concentrated within a small group, usually the board of directors or executive leadership. DAOs challenge the traditional hierarchical structure, championing a decentralized and democratic approach to decision-making. Stakeholders have direct involvement in governance through a token-based voting system. This enhances both the velocity and the fairness of the decision-making process. In contrast with traditional organizations, DAOs may include members from different parts of the world, linked by code and a shared objective. Decentralization extends to the DAO's architecture; once deployed, it operates autonomously, governed by smart contracts and consensus protocols.

The ability of DAOs first extends their adaptability. DAOs adapt quicker, potentially proving more resilient in volatile markets. Second, transparency is highlighted as a significant advantage lacking in most traditional governance systems. DAOs' blockchain foundation makes all organizational activity and choices transparent and permanent, thus increasing stakeholder confidence. Third, DAOs offer accountability advantages compared to centralized models. DAOs share decision-making among tokenholders, creating a sense of shared ownership. Decentralized frameworks within DAOs grant stakeholders more power, resulting in faster, more adaptable operations. (Hashemi-Khiabani and Polónia, 2023)

Pawlowski (2024) describes blockchain as a governance tool that allows for both transparency and privacy. Blockchain is a digital ledger recording ownership and transactions without a central controller. This is achieved using digital signatures and validation from independent nodes. Agreement from all ledger-holding nodes is required for any ledger changes. All transactions are permanently recorded in the tamper-proof ledger, creating a complete and auditable history.

The outcome of DAOs accelerates governance by coordinating accountability, predictability, and shared understanding to create more manageable parameters. The design of a decentralized governance system with a DAO implementation is characterized as shown in Table 2.6 below. This table outlines the key components and functions of such a system, including its purpose, user base, medium of exchange, and how it enables fair participation among stakeholders. It also details the role of the treasury and how users, who are active community members and affiliated stakeholders, get the opportunity to participate in the decentralized ecosystem via governance tokens. (Pawlowski, 2024)

Table 2.6
DAO-Based Governance System

Purpose	Decision-making around strategy and execution affect digital and physical infrastructure among other things
Users	Active community members, small–medium sized enterprises, government authorities, grants makers, and affiliated stakeholders (among others) around the project ecosystem get the opportunity to participate in the decentralized ecosystem via governance tokens
Medium of exchange	Governance tokens are fungible: per the ERC20 token standard
Use	Holders of the token gain the ability to vote on ecosystem-specific DAO policy
Treasury	Serves the role of fund administration, governs the monetary policy, and provides liquidity for individual urban environments and projects within those urban environments; over time, a dedicated economy is built by driving adoption and unlocking community growth
Fair participation	Governance tokens can be swapped according to the platform economic model but are also allocated depending on the group of stakeholders; after a set period, the token score is reset to enable new entrants in the community to have more equal opportunities; it is not available for external speculation

Source: Pawlowski (2024, p. 93)

From a structured standpoint, a straightforward DAO framework could incorporate a treasury, network validators (nodes), and diverse projects, with members contributing to projects, as depicted in Figure 2.3 (Pawlowski, 2024).

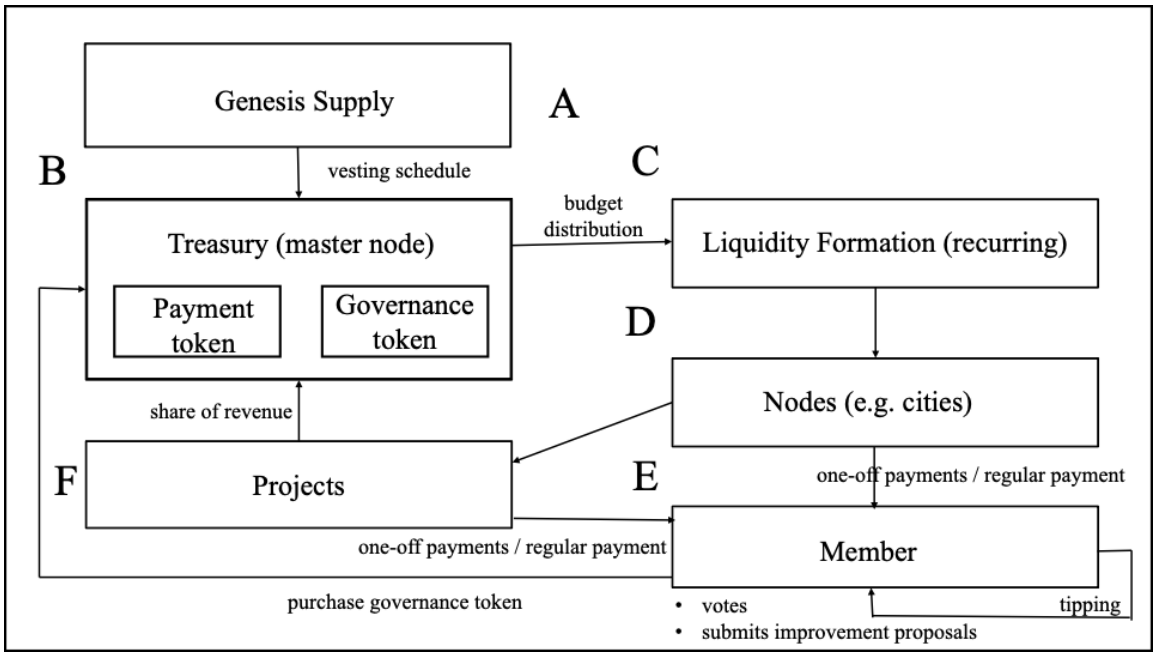


Figure 2.3
Simple DAO Concept
Source: Adapted from Pawlowski (2024, p. 94)

Launching and managing a DAO necessitates addressing various requirements during the initial design phase of the new organizational structure. The first critical step in DAO formation is gathering like-minded individuals around a common purpose. In many cases, DAOs find their first momentum on social media platforms or result from real-world organizations. Founding members define the DAO's goals, governance, and launch plan. DAO communities are often structured around an established community or blockchain-centric application. (Pawlowski, 2024)

The process starts by identifying a community aim—this can be a tangible, quantifiable aim or a less concrete aspiration. This phase is established in founding documents, either articulated formally or captured explicitly in a 'constitution'. A defined initial purpose allows a DAO to develop into a movement, a grant organization, or something else. Table 2.7 presents the fundamental requirements for establishing a DAO. (Pawlowski, 2024)

Table 2.7
Basic Requirements in DAO Formation

Constitution	A statement of purpose, including mission, vision, values, and objectives
Proposal	The decision-making process will start with a proposal that is put forward by a member. Proposals can range from cybersecurity upgrades to overhauls of the organization's purpose
Token	Valuable property is contained in the form of tokens,[a] representing the voting power and being used to reward each member
Autonomy	Independence without external influence are core attributes. Both open-source code and the organization are fully transparent. Core functionalities and rule sets are hard-coded on the blockchain and history of changes immutably notarized and opened to third parties' audit
Consensus	In the event of decision-making, for example, to make changes to the infrastructure, members need to agree democratically
Contractors/ Core Contributors	The DAO 'hires' specialists, developers, and other contractors based on community decisions to accomplish tasks and reach business goals. In the case of Fab City, core contributors can be designers, manufacturers but also (local) government members, owners of FabLabs, universities and other value chain participants that can and should affect the core DAO purpose
Voting	Strategy and execution are determined by activities like raising funds, collective investments and improving infrastructure among other things to take place if a majority vote is reached.

Source: Pawlowski (2024, p. 95)

The potential of DAOs as blockchain-powered governance mechanisms is substantial. Nonetheless, DAOs must handle major legal, regulatory, social, systemic, and technological issues. These points are summarized in Table 2.8 below. Specifically, the legal and regulatory issues include jurisdictional uncertainty due to their decentralized nature, which raises questions about tax implications. There's also uncertainty regarding a DAO's legal status, which affects the legal protections and laws its members must follow. Social and systemic issues involve voter incetivization, engagement, and fatigue, which are difficult to maintain. There can also be information asymmetry between creators and contributors, leading to a concentration of power. On the technical side, challenges include security and decentralization/scalability, both of which are related to protocol-specific weaknesses. Despite these challenges, DAOs have substantial potential as a blockchain-powered governance mechanism. (Pawlowski, 2024)

Table 2.8
Overview of DAO Challenges

Legal and regulatory	
Jurisdictional uncertainty	No registry with a fixed location as it operates in a decentralized manner. This raises questions about tax implications
Legal status	Associated with the location is the question about the legal form of society the DAO would represent. This will determine the laws and legal protections the members and shareholders of the DAO would need to adhere to (Kypriotaki et al., 2015)
Social and systemic	
Voter incetivization and engagement (fatigue)	Active and persistent engagement is challenging to uphold. Specific voter participation thresholds may pose a viable solution besides incentivization
Information asymmetries between creators and contributors	Missing detailed information leads to power concentration
Power concentration on the vision of decentralization	Creators are often too closely affiliated to DAO after launch
Technical	
Security	Protocol-specific weaknesses
Decentralization / scalability	Protocol-specific weaknesses

Source: Pawlowski (2024, p. 96)

The DAO framework has faced scrutiny for potential conflicts with the fundamental principles of decentralization and anonymity in DAOs. As shown by Li et

al. (2023), managing DAOs is still complex, making it hard to create scalable, secure, and efficient solutions for resource allocation and collaboration.

On the other hand, Strnad (2024) focuses on economic DAO governance and its control approach. DAOs operate through the execution of code and have no centralized management. DAOs commonly adopt a token-based voting system for participant decision-making, a mechanism analogous to corporate shareholder voting. Extensive governance experimentation and commentary are both occurring. The primary focus of experimentation has revolved around diverse voting mechanisms, encompassing quorum-based token voting and direct democracy where tokenholders take part in voting, subject to meeting a quorum.

Token voting clashes with the goal of decentralization because of the danger of two types of entrenchment that threaten to create the equivalent of centralized management. First, explicit control is achieved through the accumulation of a sufficiently large token position. Second, a chronic lack of voter participation frequently results in implicit control being wielded by a small group of active tokenholders who consistently participate in governance voting. The ongoing lack of participation may be considered rational in multiple scenarios. Passive tokenholders could consist of portfolio investors or individuals with holdings too small to justify the expenses of being a knowledgeable voter, particularly given the low likelihood of influencing proposals significantly in favor of higher token values or other outcomes. In a wider context, the gains realized from any investment of effort by a tokenholder in becoming an informed voter will largely accrue to fellow tokenholders who, in essence, are free riders. (Strnad, 2024)

In order to address the danger of entrenchment and other major potential problems for DAOs, Strnad (2024) proposes a new form of DAO governance that uses a sequential auction mechanism to overcome entrenched control issues that have emerged for DAOs

by creating a regime of temporary contestable control. The proposed mechanism mitigates public choice problems common to voting mechanisms, yet concurrently offers a means to improve and safeguard the value inherent in DAO voting and alternative non-market governance structures. It is resilient to null ballots and computationally achievable. This enables DAOs to achieve both their normative and operational objectives despite varied regulatory frameworks. This mechanism transfers control to the entity presenting the most compelling business strategy, concurrently facilitating a redistribution of societal surplus which incentivizes further investment.

Boumghar et al. (2024) discuss a decentralized and neutral consensus mechanism within the Space DAO as an example. When discussing decentralization, the authors are referring to the decentralization of: i) governance: the capacity to change the network rules and business logic; ii) trust: in a single entity exchange, the receiver party has to trust the emitting one creating the necessity to trust it, while in a decentralized network, several entities have to act for the provision of the same information; and iii) validation capabilities: decentralization, typically linked with reduced control, offers protection against data manipulation issues.

A DAO constitutes an autonomous organization that facilitates stakeholder interactions and provides a mechanism for modifying rules through proposals and elections. Several methods exist for achieving this, including flat, staked, and quadratic voting systems. Quadratic voting is frequently cited in the literature on public goods management as a means of mitigating the influence of wealthy actors in elections. (Boumghar et al., 2024)

The consensus-creation workflow is illustrated in Figure 2.4 below. Operators connect to the network using a bridge built with data providers from their operations API (i.e. Application Programming Interface). All operators have an API to automate data

collection in their mission control system. Operators initiate a network request to achieve consensus on a specified conjunctive event. The request specifies a Time to Closest Approach (TCA) range and identifies the Resident Space Objects (RSOs) involved. The request may incorporate a configurable whitelist of data providers to accommodate operator preferences. While not preventing others from participating, this approach nevertheless guides the reward system. Initiation may be automated, scheduled, or manually triggered. (Boumghar et al., 2024)

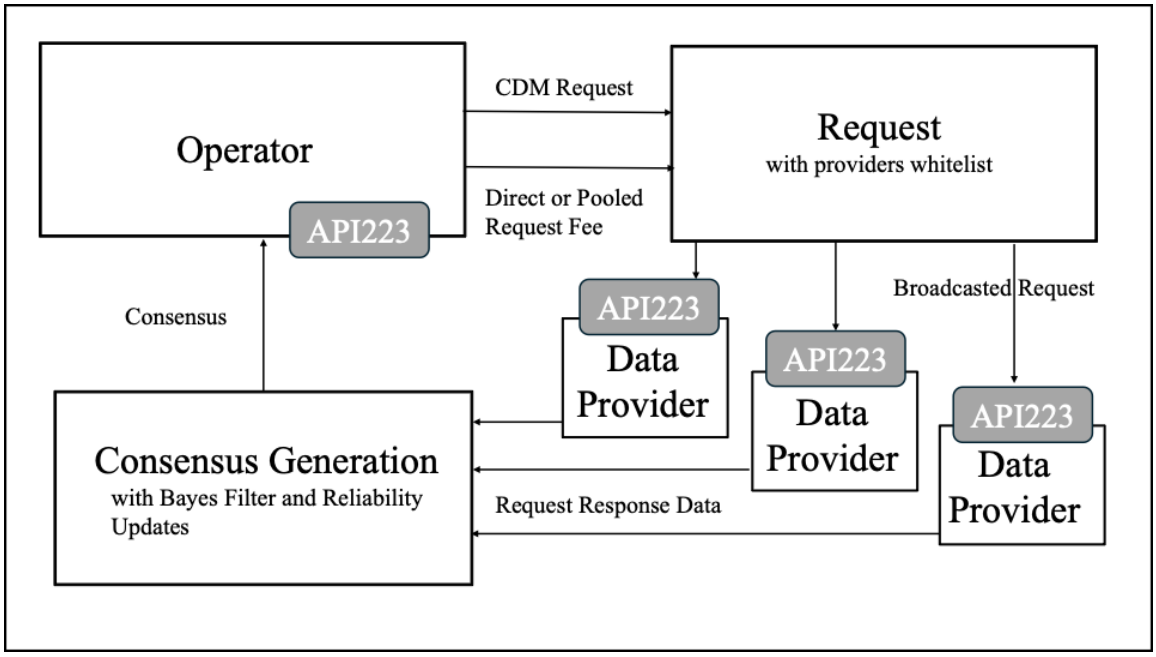


Figure 2.4
Consensus Creation Workflow in a DAO
Note: CDM stands for Conjunction Data Messages.
Source: Adapted from Boumghar et al. (2024, p. 7), modified by the author

Furthermore, as mentioned by Han et al. (2025), a crucial element of DAO governance—the perception of complete decentralization and absence of oversight—is frequently misunderstood. Operationally, many DAOs are embedded within complex structures involving associated entities. This is exemplified by Uniswap Labs, which exerts considerable indirect control over the Uniswap DAO without direct member input.

Off-chain governance mechanisms, including Snapshot, remain reliant on trusted parties for vote verification and subsequent on-chain implementation of proposals. Paradoxically, while DAOs aim for decentralization, crucial decision-making and protocol development frequently depend on centralized entities.

Han et al. (2025) indicate the vulnerabilities of DAO-based governance. DAOs are susceptible to governance attacks or hostile takeovers, where an entity amasses voting power or influences tokenholders to advance self-serving proposals, frequently exploiting the permissionless and tradable characteristics of governance tokens. Governance attacks may be categorized into several classifications, including vote buying, bribery, and the exploitation of code vulnerabilities.

Han et al. (2025) show conflicts of interest in DAOs. DAOs face conflicts of interest due to differing and potentially conflicting stakeholder incentives. These conflicts may involve disputes between various investor classes, as well as users, developers, and the DAO. Effective governance and community engagement depend on fixing these problems. In particular, the authors focus on conflicts between large and small participants, where large stakeholders ('whales') are individuals or institutions, such as founders, developers, and venture capitalists, with vested interests on a platform. The influence of large tokenholders may overshadow smaller investors' voting power, creating a power imbalance that marginalizes the preferences of smaller participants in decision-making processes. Whales might prioritize short-term profits in their proposals, which could jeopardize a protocol's long-term sustainability.

Santana and Mikalef (2024) focus on main DAO governance challenges: i) challenges in DAO management and operations stem from the decentralized governance model's application to daily operations, managerial tasks, governance processes, and resource allocation; ii) collusion within DAO networks to manipulate treasury resource

allocation constitutes a significant challenge. The necessity for consensus-based governance in DAOs creates vulnerability to coordinated efforts to subvert investment and project funding decisions; and iii) the significant expense of governance proposals coupled with limited network engagement in discussions and voting highlights a challenge inherent in the open and democratic governance structure of DAOs.

According to Lustenberger et al. (2025), the 2024 European DAO Workshop (DAWO24) advanced DAO understanding and highlighted the current research. Key areas vital to DAOs' continued progress were highlighted at DAWO24, showcasing advancements alongside critical gaps needing research. Four key areas driving DAO research emerged from the authors' analysis: governance; technology; valuation; and legal issues. One of the central themes at DAWO24 was the analysis of governance mechanisms within DAOs. The workshop stressed the importance of robust governance frameworks that balance power, ensure transparency, and resolve conflicts, thus upholding inclusivity and fairness within DAOs. DAWO24 attendees accentuated the importance of scalable, secure, and user-friendly technical frameworks for decentralized applications (dApps) deployment and improved DAO functionality and sustainability. A major discussion topic was how DAOs benefited people and society. Finally, the workshop explored the legal and regulatory dimensions of DAOs. DAWO24 attendees explored the possibility of legal DAO recognition, debating adaptable regulatory frameworks that encourage innovation while safeguarding stakeholders.

Wang (2025) notes that DAOs provide benefits such as transparency, efficiency, and global collaboration while saving money. However, she also indicates that major hurdles persist, especially concerning legal standing, adherence to regulations, streamlined decision-making, financial stability, and adaptable governance. DAOs, while offering a compelling alternative to traditional bureaucratic structures, necessitate the

resolution of inherent challenges and the development of effective mechanisms for seamless integration within extant legal and regulatory frameworks for widespread adoption.

Decision-making in DAOs is hampered by the requirement for collective consensus, often resulting in protracted discussions and operational paralysis. A significant impediment to effective DAO governance is voter apathy. Due to the prevalent use of token-based voting in DAOs, governance tends to be dominated by a small, highly active group, with a significant portion of tokenholders remaining passive. Insufficient voter participation may result in governance decisions that are unduly influenced by a limited number of individuals or entities, consequently eroding the democratic ideal of decentralization. The governance process within DAOs is susceptible to manipulation. The concentration of governance tokens among major stakeholders may lead to governance outcomes skewed toward the interests of those with significant holdings. This powerful concentration goes against fair and inclusive decentralized governance. (Wang, 2025)

Summing up, among various DAO forms, this study focuses mainly on microenterprise management transforming into or integrating with an LLAO or a DAO LLC, a recent generation of DAO with legal personality. The lack of clear legal frameworks in various jurisdictions creates ambiguity about the legal status of DAOs and their participants. Despite such an uncertain legal landscape for DAOs, prior studies have explored the potential impact of DAOs on various aspects of business management, including trust; business valuation; corporate governance; transparency; adaptability; accountability; efficiency; and predictability. However, a crucial element of DAO governance—the perception of complete decentralization and absence of oversight—is

frequently misunderstood, while suffering from operational challenges for the DAO governance.

2.3.3 Banking method for Assessing Microenterprise Credit Risk

Investors may check if startups are good investments, seeking high returns (e.g. 20–75% Internal Rate of Return [IRR], 3–10x multiple) over 3–10 years and evaluating the capability of the management team. Emerging 'ventureDAOs' and individual/Web3 investors may also find these common practices helpful in shaping their investment strategies. By contrast, due to the information asymmetry inherent in the lending business model, MSME lenders have traditionally employed a financial statement analysis method since the end of the 19th century in the U.S.

Further back in the history of banking method for credit risk assessment in mid-19th century in the UK, the bankers not only had to assess information regarding the wealth of the client (i.e. collateral security that is readily convertible into money) but also their 'reliability' and 'trustworthiness'. The 19th century bankers were seeking to provide credit to the borrowing customer who had both the means and the inclination to repay, whatever the circumstances, and looking to 'filter out' those who were 'untrustworthy' with limited means. With regard to the development of 'trust', in her article *Production of trust: Institutional sources of economic structure*, 1840–1920, Zucker, L. G. (1986) identified three different 'trusts'. First, 'process-based trust' that develops from long-term stable relationships because of institutional processes rather than personal relationships. Under these conditions, the participants assume that past 'good' behavior, or a positive reputation, will be repeated. Second, 'characteristic-based trust', whereby reliance on the premise that such characteristics as family background, religion or ethnicity, may be used as justifications for trust. Finally, 'institutionally based trust' that exists when trust is

related to formal structures in society, independent of the preferences and actions of individuals. (Galassi and Newton, 2001)

In consequence, due to the information asymmetry issue for MSME customers with unreliable financial data and its limited disclosure, the bankers have acknowledged the necessity of gathering 'non-financial information', i.e. business owners and their real management to better assess MSME credit risk.

For instance, Berger and Frame (2005) explain: In the mid-1990s financial institutions began to combine the business information to create scores for small business credits in the U.S. Within such a credit scoring system, the scores were based primarily on 'hard' quantitative information. These financial institutions also attacked the opacity problem using 'relationship lending' based on 'soft' qualitative information gathered through contact over time with the firm, and often with its owners, managers, and other members of the local community. Acquisition of qualitative data is time-consuming and presents challenges in terms of observation, verification, and dissemination.

Elyasiani and Goldberg (2004) discuss the necessity of 'relationship banking' for small customers. Several methods exist for assessing borrower creditworthiness; however, cultivating enduring lender-borrower relationships proves helpful for evaluating opaque firms. The relationship method of obtaining information that is not readily available from financial statements would be more appropriate. Typically, large firms are more transparent than small firms. As a result, relationship banking has developed as a method of gathering the necessary information from the smaller borrowers.

On the other hand, 'community banking' is a conventional MSME banking model, where a 'community bank' typically adopts 'relationship lending'. Lux and Greene (2015) explain the concept of 'community bank'. Community banks are defined as relatively small, independent banks primarily focused on providing fundamental

banking services to their local communities. Community banks exhibit substantial internal variation. Community banks extend their reach through branches and ATMs. Some community banks might have branches in nearby towns or partnerships with other community banks. Community banks frequently exhibit characteristics of local ownership and management. Traditionally, the concept of 'community' was characterized by local ownership, fostering connections to the town, region, industries, and consumers. A key element of the robust ethos of community banking was the presence of a local board that directly approved loans, leveraging its intimate understanding of the customer base. Relationship banking is a common practice at community banks. In contrast with larger banks, their financial statements reveal lower leverage and returns, and a demonstrably lower adoption of technology. Their engagement in capital and securitization markets is less extensive than that of larger banking institutions. Their revenue streams exhibit reduced diversity, thereby increasing their vulnerability to disruption.

Berger and Udell (2002) delineate the practical distinctions between transaction-based lending and relationship-based lending. Financial intermediary lending to small businesses encompasses at least four key technological approaches: financial statement lending, asset-based lending, credit scoring, and relationship lending. In comparison to banks primarily engaged in transactional lending, those offering relationship-based lending services must authorize their loan officers with increased decision-making power; smaller banks exhibit a more effective approach to navigating the challenges associated with this delegation of authority.

Hein et al. (2005) discuss why large banks tend to adopt transaction-based lending. Large commercial banks exhibit a greater emphasis on transactional services, whereas smaller community banks prioritize client relationships. Transactional banking

typically exhibits economies of scale, as unit costs decrease with increased banking institution size. Because larger banks benefit more from economies of scale and scope in transactional banking, they'll likely concentrate more on it, leading to further industry consolidation.

Despite the recent proliferation of AI- and machine learning-driven MSME credit scoring models, Beltrame et al. (2023) still accentuate the importance of collecting MSME borrower's non-numerical information through 'relationship lending'. Because of asymmetric information, lenders get information about MSME borrower's quality, which is shown by a set of firm characteristics. Given the rarity and cost of information on MSMEs, 'relationship lending' is often viewed as the optimal method for data collection. The banks thus acquire soft information, which comprises non-numerical information (e.g. strategy, quality of managers and products, future business development) that does not appear in a financial statement analysis.

Li (2022) lists all necessary data for SME credit risk assessment and monitoring: i) data on loan application information verification; and ii) various data supplements during the loan period. The data on loan application information verification includes: enterprise historical dishonesty data, court execution data, enterprise illegal production data, enterprise tax abnormal data, enterprise product quality complaint information, enterprise executives' personal abnormal data (including identity verification, real name authentication, personal resume fraud, frequent replacement of mobile phone number, and common equipment), no abnormality, whether the common contacts are abnormal and others. The various data supplement during the loan period includes: the tax payment data, customs import and export data, electricity consumption data, logistics and transportation data, bank flow data, business data of upstream and downstream manufacturers, personal information data of enterprise executives, the sales, production,

product quality, and other business situations, information on the changes of senior executives, and other data.

Accordingly, besides AI- and machine learning-driven advanced algorithms, leveraging diverse data sources with 'Big Data' should be beneficial for financial institutions to better assess SME creditworthiness. Hurley and Adebayo (2016) explain that there have been discussions on how to use 'Big Data' for the MSME credit scoring. Although traditional factors, such as those used by FICO (Fair Isaac Corporation), remain central to contemporary lending decisions, the credit-scoring industry is witnessing a rapid shift to new, alternative tools. Experian, for instance, uses 'Big Data' to create detailed customer profiles combining online and offline information. FICO has been testing out a new system 'FICO Score XD'. Although some data used in these alternative tools, such as utility bill payment histories, appears relevant to a customer's loan management, other 'fringe data' is expanding despite lacking an obvious connection to creditworthiness.

On the other hand, with the recent advancement of digital technology, 'Open Banking' (OB) has acquired increasing attention thanks to several legislative initiatives undertaken in different jurisdictions worldwide (Colangelo and Khandelwal, 2025). Bank for International Settlements (BIS) (2019) defines OB as follows:

> The sharing and leveraging of customer-permissioned data by banks with third-party developers and firms to build applications and services, including for example those that provide real-time payments, greater financial transparency options for account holders, marketing and cross-selling opportunities. Individual jurisdictions may define open banking differently. (Bank for International Settlements (BIS), 2019, p. 4)

Historically, regulatory changes in the mid-2010s gave birth to OB. A banking sector investigation by the UK Competition and Markets Authority found that reduced competition results in poorer, pricier consumer deals. This made the UK introduce *the Open Banking Standard* in 2018 as a bid to raise competition and consumer choice in the market. Simultaneously, the second Payment Services Directive (PSD2) mandated that banks must grant third-party providers (TPPs) access to customer data, contingent upon obtaining proper consent. Regulatory changes allowed banks to share data, leading to better consumer financial products. Introducing these regulations marked a watershed moment in the global banking industry, facilitating a paradigm shift from closed, proprietary systems to open ecosystems. (Shacheendran et al., 2025)

Today, many nations have or are developing systems for OB, enabling secure client-authorized data sharing APIs. In addition, several countries are exploring the extension of such rules to encompass financial services, thus promoting Open Finance (OF). (Colangelo and Khandelwal, 2025)

Operationally, OB enables TPPs to access customer financial data securely via APIs. This establishes a novel dimension in the interplay between banks and fintech firms, revolutionizing the delivery of innovative financial services directly to consumers. OB's foundation is built upon regulatory compliance and technological advancements, fundamentally altering the traditional customer interactions for both corporate and individual clients. This development signifies expanded possibilities for personalized financial services, enhanced financial inclusion, and the ongoing evolution of banking practices. This new paradigm empowers customers, granting them greater control over their data and access to services. OB fosters innovation by enabling fintech firms to create applications and services tailored to the needs of its active users. (Shacheendran et al., 2025)

There are quite a few challenges to be overcome for OB's successful working. Data security and privacy are major issues since sharing sensitive financial data increases the risk related to cyberattacks and unauthorized access. Robust regulatory frameworks, such as PSD2, notwithstanding, data security remains a persistent challenge. Another hurdle is cultivating customer trust. A significant number of consumers express apprehension regarding the disclosure of their financial data to unfamiliar or untrusted third-party vendors. This necessitates transparent and trustworthy customer relationships between banks and TPPs. OB also faces regulatory complexities. Variation in regulatory approaches to OB across different regions presents significant challenges to banks and fintech firms, particularly those with cross-border operations. Ironically, however, legacy systems frequently impede progress, and established banks may be reluctant to share data with potential rivals. These challenges underscore the necessity of continuous innovation and adaptation within the evolving OB ecosystem. (Shacheendran et al., 2025)

Regarding the MSME banking practice in Japan, while Japanese financial institutions have been emphasizing 'relationship banking' and 'community banking' in their MSME financing practices, Yoshino (2011) conducts a survey and analysis of 299 Japanese financial institutions to determine the extent to which 'soft information' (qualitative information), i.e. i) non-financial and non-numerical information, ii) non-public information, and iii) information that is difficult to verify by a third party has been used in the lending practice. The results show that 'management evaluation' (95.0%) is the most popular soft information. This is followed by 'evaluation of corporate/business potential' at 80.3%. In addition, nearly 50% of financial institutions add soft information as a score in the calculation of internal credit ratings.

According to the inspection manual prepared by the Japanese Financial Services Agency (2019), regarding the classification of MSME borrowers, not only the financial

condition of such enterprises but also their technical capabilities, sales capabilities and growth potential, the payment status of remuneration to the representative and other executives, the income status and asset content of the representative, the guarantee status and guarantee capacity, and other capabilities shall be comprehensively examined and it shall be judged from the business reality. In common practice, Japanese financial institutions use indicators that cannot be measured quantitatively, such as management and management team, business environment, and the company's own competitiveness and strengths, as key points regarding non-financial analysis of qualitative evaluation. (Fujii, 2022)

For financial institutions, the collection of soft information, such as the reputation of SME managers and the feasibility of their business plans, is labor-intensive and time-consuming, but in Japan, the quality of screening information has been improved through long-term business relationships with MSME customers (i.e. ‘relationship banking’). However, the evaluation of soft information is difficult in that it cannot be used as an objective indicator because it does not eliminate the personal element of the person in charge at the financial institution. In addition, it takes time and effort to pass on the know-how of soft information evaluation to younger staff members of financial institutions. (Nemoto, 2022)

While AI-backed FinTech has been spreading in Japan, especially in the field of ‘alternative finance’, there are limits to lending methods that rely solely on AI-backed screening in MSME lending practices, given its technological limitations. The purpose of machine learning is to find a law from given data, and then to obtain a model that may be successfully inferred from data with similar characteristics, but the theory behind the generalization is unknown (i.e. ‘black box’). In many cases, generalization performance is problematic because causal relationships are not captured in the statistical inference

process. In such cases, perturbations of the input are likely to cause a blip in the prediction. This ‘black box’ problem is one of the biggest challenges in AI-backed screening, but in the case of deep learning, it is difficult to explain the theoretical basis of generalization in a structured manner. In addition, the use of poor or inappropriate quality data for training data may lead to erroneous or biased decisions. Although these problems may be eliminated to some extent by using the traditional ‘relationship banking’ practiced by many Japanese financial institutions, it may be necessary to establish certain ethical standards for ‘alternative finance’ providers, which have become popular in recent years. (Nemoto, 2022)

To sum up, due mainly to the information asymmetry issue for MSMEs with unreliable financial data and its limited disclosure, the bankers have continuously recognized the necessity of gathering MSMEs’ non-financial information through ‘relationship lending’ and ‘community banking’. The traditional approach of credit assessment since mid-19th century is still valid in that the bankers not only need to assess information regarding the wealth of the MSME customers (i.e. collateral security that is readily convertible into money) but also their ‘reliability’ and ‘trustworthiness’. Despite the advancement of AI- and machine learning-driven algorithms and advanced credit scoring models, MSME-focused financial institutions need to continue to collect and analyze high-quality non-financial information within their screening and monitoring systems. Assuming that this process may be done more efficiently in the era of ‘Big Data’ and under the OB frameworks, leveraging both a novel form of DAO and diverse ‘data’ sources can be beneficial for any type of financial institution.

2.3.4 Impact of DAO on Financial Access for Microenterprises

No study has previously attempted a comprehensive examination of how DAO transformation or integration specifically affects microenterprises' financial access. However, several studies show the positive impact of 'blockchain technology' on SMEs' financial inclusion by alleviating the information asymmetry.

Cui and Bulis (2023) discuss that the development of blockchain technology provides a new path to solve the information asymmetry through an exploratory research and feedback obtained from SME interviews and eventually proposes a comprehensive credit information system as the fundamental infrastructure for SME financing. The authors attempt to analyze the applicability of blockchain technology in SMEs' financing. Blockchain technology distributes accounting, moving data storage and exchange away from centralized systems. It adopts the method of breaking the whole into pieces, allowing the data to be stored in peer nodes in the Internet, which makes the distributed system accounting technology not only overcomes the information monopoly problem caused by the centralization of data information, but also integrates a lot of scattered information into the blockchain, realizes decentralized and transparent information sharing, and may solve the asymmetrical information problems of SMEs, thus to provide a new approach to solve the problem of information asymmetry in the financing process.

Their research paper also examines how blockchain's DLT may help or hinder SME financing, suggesting a basic framework to solve the information gap between SMEs and financial institutions. For example, when a commercial bank extends loans, it must assess SMEs' creditworthiness, encompassing their operations, capital flow, collateral, and recent high-risk transactions to gauge their credit and repayment capacity. DLT allows integration of the SMEs' relevant information onto the chain. It may help

banks to reduce the cost of collecting information to judge the credit status and repayment ability of SMEs. (Cui and Bulis, 2023)

In the supply chain financing based on accounts receivable and bill financing, DLT can integrate primary suppliers, secondary suppliers, core enterprises, primary distributors, secondary distributors, and logistics enterprises. Transaction information between them (i.e. accounts receivable, prepaid accounts, bill issuance, bill acceptance, and bill endorsement) is integrated through distributed accounting technology, so that the transaction information of the entire supply chain is transparent and open. Inquiry ensures the authenticity and validity of the information. Banks and other financial institutions may leverage this to expand credit to businesses. (Cui and Bulis, 2023)

Blockchain's timestamp technology ensures continuous blocks, preventing deletion or insertion, thus guaranteeing data authenticity and immutability. The blockchain's consensus mechanism requires most nodes to approve data entries, preventing single-node errors and synchronizing all node data. The data synchronization of each node makes all data traceable and ensures the authenticity of data information. (Cui and Bulis, 2023)

These points demonstrate the positive impact of blockchain technology on modern finance. It may reduce costs and bring about changes to the financial system in the long term. Blockchain will change the existing finance industry because of the innovation in storing and transmitting data. Blockchain may offer a more efficient way to transfer assets than traditional finance. (Cui and Bulis, 2023)

Blockchain technology mitigates information asymmetry, expanding SME financing opportunities, yet challenges and risks remain. For example, blockchain technology's limited legal and user recognition, coupled with its decentralized nature, hinders widespread adoption and may lead to negative consequences. The blockchain

technology is still immature. The major challenges in adopting blockchain are scalability and latency issues. Blockchain technology presents technical, operational, and other challenges. Significant technological hurdles include cross-chain interoperability, framework identification, and data governance. Employment loss and regulatory issues are also important challenges and should not be ignored. A systematic and comprehensive system for finding the path for SME finance applying blockchain technology is needed. (Cui and Bulis, 2023)

Through a qualitative research approach with a case study in the city of Kendari, Indonesia, Husriadi et al. (2024) show the effectiveness of blockchain technology in increasing transparency and data security for MSMEs and imply that MSMEs may use blockchain technology to improve their business performance and meet increasingly stringent compliance requirements. By integrating blockchain technology into their operations, MSMEs may reduce the risk of data breaches and information manipulation, as well as increase trust with customers and business partners. Blockchain also helps MSMEs cut costs, boost efficiency, and streamline operations. Blockchain technology thus offers Kendari City's MSMEs data security benefits and boosts their growth and sustainability.

Similar to other digital technologies, blockchain adoption hinges on enabling conditions, capabilities, and incentives, potentially boosting corporate productivity. Digital technologies, such as cloud computing and front/back-office applications, are shown to boost enterprise-level productivity. However, corporate adoption of technology is highly dependent on access to supporting physical infrastructure (e.g. high-speed broadband internet) as well as well-functioning product, labor, and financial market settings. Technology spreads faster with better managers, strong companies, and skilled

employees. Understanding the social and ethical ramifications of blockchain is crucial; its adoption must not widen the digital divide. (Husriadi et al., 2024)

Chen (2023) offers novel perspectives on leveraging blockchain technology to enhance SME operational efficiency, specifically by addressing information asymmetry, lowering equity and bond financing costs, and alleviating financing challenges within the context of 'Big Data' as follows.

SME bank loans: blockchain technology's decentralized structure improves the security and dependability of cryptocurrency assets, thereby reducing information asymmetry in SME bank loan acquisitions. Blockchain-based lending and loan systems may optimize the borrowing process for SMEs, minimizing paperwork and enhancing efficiency. Utilizing cryptocurrency for asset conversion enables enterprises to secure augmented bank loan funding for developmental initiatives. Upon confirmation of the business creditworthiness, the bank may extend a loan. A bank possessing the business accurate blockchain address may continuously monitor the funds movement and the remaining balance. Their constant, complete access to this data eliminates banking concerns regarding potential risks such as account manipulation or money laundering via rapid transactions, due to the complete traceability of all transactions. (Chen, 2023)

Bond issuance of SMEs: corporate bond issuance constitutes a substantial funding mechanism within the market. However, the informational asymmetry inherent in the relationship between business owners and investors—where owners possess superior knowledge of the business's intrinsic value—may lead to an undervaluation of the bond. Conversely, the paucity of information available to investors necessitates abbreviated evaluations and investigations based solely on corporate disclosures. The unreliability and inadequacy of investment information pose a significant risk. Thus, corporate default remains a possibility. The use of blockchain or cryptocurrency makes company

information public. Therefore, it reduces information asymmetry, increasing investor confidence. Enhanced transparency of information will facilitate investors in effectively assessing a company's financial health and conducting thorough due diligence. This mitigates investment risk. Given the data, investor due diligence will assess the company's capacity to fulfill its bond obligations. (Chen, 2023)

Stock issuance of SMEs: stock issuance and investment processes may either help or damage stakeholders, depending on how much they know about the company. However, the real value of the company is difficult to prove because of insufficient information for calculation. The application of blockchain technology, as employed in financial transactions and asset management, increases transparency for investors assessing SME equities, consequently reducing information asymmetry. Blockchain has the potential to transform the process of stock issuance for companies, similar to its influence on bond issuance, providing enhanced visibility into a company's financial status for individuals and entities alike. The enhanced corporate transparency mitigates investor concerns regarding valuation, redirecting focus toward real-time data analysis for growth potential and stock appreciation. (Chen, 2023)

The decentralized and transparent attributes of blockchain technology, as Kumar et al. (2023) explain, offer considerable potential in mitigating the SME credit gap through blockchain-based financing. Transparent record-keeping in distributed ledgers reduces fraud and increases trust. Smart contracts automate financial processes, cutting administrative costs and streamlining operations for SMEs and lenders. This technology is transforming supply chain finance (SCF), credit processes, and capital market access for SMEs. In addition to enhancing established models, this development has also generated novel models and mechanisms for SME financing.

In particular, integrating sophisticated SCF mechanisms with blockchain technology facilitates a paradigm shift, granting SMEs improved access to capital, strengthening their financial stability and operational efficiency. The continuous development of this beneficial relationship offers a promising prospect, advancing SMEs toward a future characterized by transparency, efficiency, and enduring financial growth. The continued importance of SMEs in the global economy necessitates the adoption of blockchain technology to foster growth within a competitive market and transform supply chain finance. (Kumar et al., 2023)

Although blockchain technology presents certain challenges and limitations requiring attention, this technology remains in a state of development; solutions to these challenges will undoubtedly arise in due course, enhancing the resilience of decentralized blockchain systems (Kumar et al., 2023).

Regarding the impact of DAO on financial access, Han et al. (2025) imply that DAOs reduce information asymmetry by enhancing transparency. Within a DAO, all transactions, modifications, and audits appear on the blockchain immediately, discouraging individuals from concealing fraudulent transactions and illicit activity.

Summing up, although there is no prior study attempting a comprehensive examination of how DAO transformation or integration specifically affects microenterprise financial access, several studies show the positive impact of 'blockchain technology' on SME financial access. Despite the technical and operational challenges of blockchain technology, the technology has a positive impact on SME finance. That is to say, the development of blockchain technology provides a new path to solve the information asymmetry as the fundamental infrastructure for SME financing, because DLT allows integration of the SMEs' relevant information onto the chain. Significantly, although user-friendliness is crucial, transparent record-keeping in distributed ledgers

reduces fraud and increases trust. Smart contracts automate financial processes, cutting administrative costs and streamlining operations for both SMEs and SME lenders.

2.3.5 An Alternative Financing Strategy for Microenterprises through DAOs

Figure 2.5 illustrates external funding options for DAO-integrated MSMEs. Transformation into or integrating with a blockchain-backed DAO may empower microenterprises to diversify their financial channels for maximizing long-term free cash flows (FCFs) and ensuring financial stability, in contrast to ordinary microenterprises that rely on bank loans as their sole option for external financing.

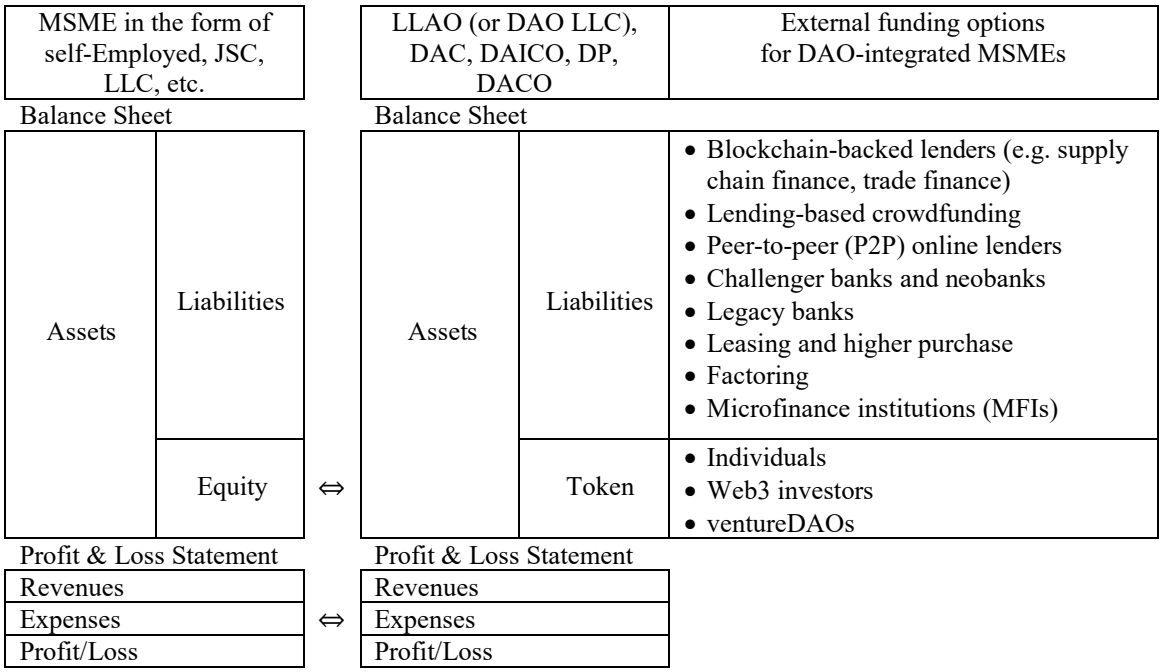


Figure 2.5
External Funding Options for DAO-Integrated MSMEs
Note: 1. Regarding the relationship between a microenterprise and a DAO, there are two cases:
i) a microenterprise transforming into a DAO; and
ii) a microenterprise integrating with a DAO in parallel.
2. External financiers for high-growth startups may include angel/venture capital (VC) investors, equity-based crowdfunding platforms, and other financiers.
Source: Author's own compilation

First, in contrast to ordinary microenterprises in the form of self-employed, joint-stock company (JSC), limited liability company (LLC), or other forms, microenterprises integrating with or transforming into a blockchain-backed DAO may obtain a new path of external 'direct finance' from individual/Web3 investors (e.g. customers, fans, Web3-focused angel investors, stakeholders).

A DAO may issue its token and form an ecosystem where each token provides voting rights to its holder, excluding its marketplace value. Every tokenholder impacts the DAO's decision-making through transparent voting processes, aligning with the fundamental tenets of decentralization on the blockchain. (Karakostas and Pantelidis, 2024)

In addition to individual/Web3 investors, ventureDAOs could be potential investors for DAO-integrated startups. VentureDAOs collect funds from a decentralized network of individual investors to support startups. Rather than focusing solely on later funding stages, ventureDAOs typically invest in earlier stages, lowering the threshold for startups to access capital. In contrast with traditional venture capitals (VCs), ventureDAOs do not acquire ownership but seek a return on investment (ROI) through increased token value as the startup succeeds. This gives token investors the flexibility to exchange their investments easily into fiat or cryptocurrencies on exchanges, which typically takes several years to realize. (Bjellerås, 2023)

Second, enhanced transparency and managerial competencies may enable DAO-integrated microenterprises to leverage diverse financing channels, including legacy banks, lending-based crowdfunding, blockchain-backed P2P online lenders, blockchain-backed supply chain financiers, and any other DeFi service providers.

With the recent rise of blockchain around the world, DeFi emerged as a disruptive financial paradigm in the middle of 2020. It is worth considering using DeFi services for

DAO-integrated microenterprises because DeFi service providers may digitally and efficiently acquire the non-financial information of DAO-integrated microenterprises, which is essential for lending judgment. More specifically, DeFi uses blockchain for creating, distributing, and utilizing financial services, surpassing traditional finance in various aspects as follows (Jiang et al., 2023).

Trustless: DeFi protocols eliminate centralized intermediaries such as brokerages, banks, and insurance companies, which come with defects such as high costs, cumbersome processes, account opening restrictions, e.g. Know Your Customer (KYC), and lack of transparency.

Non-human intervention: DeFi's trading rules are prewritten, making automation and immutability key features while running on-chain that reduces counterparty risk and eliminates the single point of failure.

Maximal availability: most DeFi products have no downtime, enabling 24/7 financial services for everyone.

Borderless: DeFi enables global accessibility without being restricted by national boundaries, allowing anyone from anywhere, including those from low economic levels or underserved regions, to leverage its services.

Permissionless: deployed in a decentralized manner across P2P networks, it opens new opportunities for organizations, e.g. DAOs to areas previously accessible only to licensed institutions.

Extensibility: DeFi's open-source nature encourages user contributions, facilitating the emergence of novel financial concepts such as flash loans.

DeFi is rooted in traditional financial activities on the blockchain, such as lending without intermediaries. With the advent of DeFi 2.0, the field incorporated the idea of a

DAO making decisions regarding a project's liquidity within the protocol. (Karakostas and Pantelidis, 2024)

In terms of blockchain-backed P2P online lending, there is evidence showing that such a P2P lending system could be potentially scaled by such factors as cost efficiencies, reduction of onboarding time, recovery time reduction, and others (Bansal and Swamy, 2020).

Conventional crowdfunding, i.e. Initial Coin Offering (ICO) without governance mechanisms has drawbacks. This model is susceptible to credit risk due to information asymmetry. Similarly, ICO crowdfunding, despite its decentralized nature, also faces the following problems: i) lack of examination of crowdfunding information; ii) lack of supervision over the raised funds; and iii) lack of sustainable development of the crowdfunding ecosystem. (Chen et al., 2023)

However, advanced crowdfunding may be a funding option for smart contract-based DAOs. In such crowdfunding, microenterprises may receive support through many small contributions from multiple customers. As a result, crowdfunding represents a mixture of entrepreneurship and social network participation, where customers also play the role of investors. In fact, social media mechanics are used to identify promising projects that are more likely to be successful in creating more profit from the initial investment. The use of the Ethereum blockchain and smart contracts makes the applications completely decentralized. For instance, LikeStarter assigns Likoins (i.e. tokens related to an artist) to users that fund a project. These tokens may be employed and converted to buy artifacts and tokens that provide users with voting capabilities. Users support projects through token staking. The value of this project or beneficiary affects token value. Users possessing Likoins acquire also voting rights, i.e. they may

contribute to the decision of the price of certain artifacts. All these aspects give the application an autonomy that makes LikeStarter a DAO. (Zichichi et al., 2019)

Nevertheless, DeFi is still in its infancy compared to the current financial system. DeFi's immaturity hinders widespread adoption and comprehension. This means that there is a lack of standardization and regulation in the DeFi space, which may make it difficult for users to know which platforms and services are trustworthy and secure. Another limitation of DeFi is that it relies on complex smart contracts and other blockchain-based technologies, which may be difficult for non-technical users to understand and use. Limited accessibility of DeFi services prevents wider audience engagement. DeFi is also subject to the same security risks as other blockchain-based systems, such as hacking and loss of funds. The security of user funds is a major concern, potentially deterring investment in DeFi platforms. (Pechlivanidis, 2022)

Although the development of blockchain technology is still immature and faces challenges and limitations, large international banks and other financial giants have rushed to lie in the field and invest resources in technology development. Major banks have explored blockchain technology in the past years. Bank of America has drafted 35 patents related to blockchain. Barclays, Citigroup, Goldman Sachs and UBS have formed the R3 CEV Blockchain Consortium to explore the blockchain's potential to reduce costs. A new blockchain-based startup, Linq, has launched, backed by Visa and the NASDAQ. Blockchain technology has changed the business model and technical characteristics of traditional banks. In a competitive environment, these major banks must seek innovative profit models to develop financial products through i) reducing costs and value transfers by using blockchain-based solutions; and ii) controlling risks more effectively (Chang et al., 2020). Considering that MSME-focused smaller lenders may follow these major

banks in the future, it is reasonable to suppose that this study may offer a scalable and sustainable financing model for microenterprises.

To sum up, in contrast with ordinary microenterprises in the form of self-employed, JSC, LLC, or other forms, MSMEs integrating with or transforming into a blockchain-backed DAO may take various external funding options, including both 'indirect finance' (e.g. loans from legacy banks, lending-based crowdfunding, blockchain-backed P2P online lenders, blockchain-backed supply chain financiers, and any other DeFi service providers) and 'direct finance' (e.g. token-based investment from individual/Web3 investors and ventureDAOs). Although the development of blockchain technology still faces operational challenges and limitations, this study could offer a scalable and sustainable financing model for microenterprises through DAOs.

In conclusion of this chapter, despite the existing research gap regarding the impact of DAO on microenterprise financial access, the literature review offers a testable hypothesis for a Japanese case study. That is, DAO adoption may help microenterprises improve financial access through the reasoning process below (see Figure 2.6):

(1) The nature of DAOs is reflected by blockchain-enabled features in distinct governance, such as decentralization; automation (with smart contracts); autonomy (by community voting); a fully transparent organization; and token-based direct finance (RQ1).

(2) Despite the uncertain legal landscape and operational challenges for DAOs, DAOs have the potential to impact 'business' management, including trust, business valuation, corporate governance, transparency, adaptability, accountability, efficiency, and predictability (RQ2).

(3) The prior academic discussions on the key features of blockchain-enabled DAOs and their impact on 'business' management should also be relevant to 'microenterprises' through DAOs (RQ1 and RQ2).

(4) The traditional, time-consuming approach of MSME credit assessment is still valid in that the bankers need to collect and assess MSMEs' non-financial information regarding 'reliability' and 'trustworthiness'. Despite the advancement of AI- and machine learning-driven algorithms and advanced credit scoring models, MSME-focused financial institutions need to continue to collect and analyze high-quality non-financial information within their screening and monitoring systems. Assuming that this process may be done more efficiently in the era of 'Big Data' and under the Open Banking (OB) frameworks, leveraging both a novel form of DAO and diverse 'data' sources could be beneficial for any types of financial institutions. (RQ3)

(5) Despite the technical and operational challenges of blockchain technology, the technology has a positive impact on modern finance. It is because DLT allows integration of the SMEs' relevant information onto the chain. Transparent record-keeping in distributed ledgers reduces fraud and increases trust. Smart contracts automate financial processes, cutting administrative costs and streamlining operations for both SMEs and SME lenders. (RQ4)

(6) The prior studies imply that DAOs with the nature of blockchain-enabled governance may improve MSME managerial competencies in such fields as philosophy, transparency, efficiency, fairness, scalability, robustness, and sustainability, which could be an advantage for MSMEs efficiently proving their 'reliability' and 'trustworthiness' to lenders and investors (RQ2, RQ3, and RQ4)

(7) In contrast with ordinary microenterprises in the form of self-employed, JSC, LLC, and other forms., MSMEs integrating with or transforming into a blockchain-backed DAO could take various external funding options, including both 'direct finance' (e.g. token-based investments from individual/Web3 investors and ventureDAOs) and 'indirect finance' (e.g. loans from legacy banks, lending-based crowdfunding, blockchain-backed P2P online lenders, blockchain-backed supply chain financiers, and any other DeFi service providers). Therefore, although the development of blockchain technology still faces operational challenges, this study could offer a hybrid financing model for microenterprises through DAOs. (RQ5)

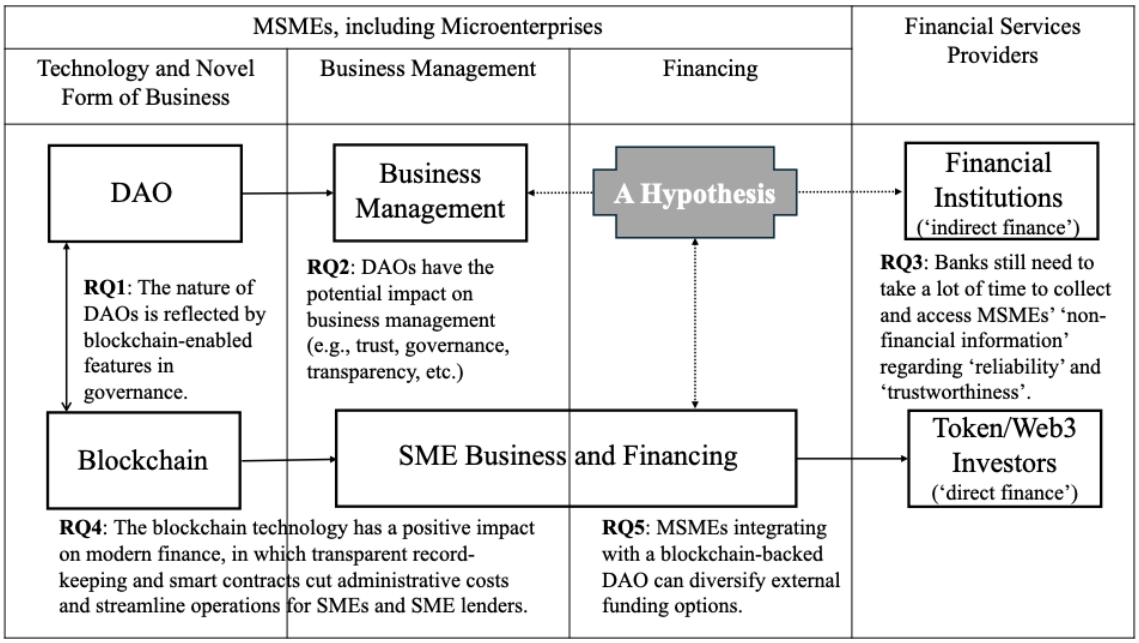


Figure 2.6

Reasoning Process Leading to the Case Study Hypothesis

Note: In this figure, a hypothesis is established for the linkages between DAO adoption, microenterprise management, and microenterprise financial access (including 'direct finance' and 'indirect finance').

Source: Author's own compilation

Beyond that, while the existing literature has largely concentrated on the technical or governance dimensions of DAOs, this Japanese case study offers an opportunity to explore their economic and institutional implications. By analyzing the DAO LLC as a legal and practical experiment in Japan, the case study extends the policy discussion to microenterprise finance and MSME policy in an international context.

The insights derived from the literature review highlight both the theoretical underpinnings and the research gap surrounding DAO adoption for microenterprise financing. To empirically explore the gaps and to validate the proposed hypotheses, this study adopts a case study methodology. The following chapter outlines the research design, data collection, and analytical approaches employed.

CHAPTER III:
METHODOLOGY

3.1 Introduction

For the purpose of investigating how DAO transformation or integration may enhance microenterprise financial access and exploring an alternative financing strategy for microenterprises through DAOs, the objective of this study was to conduct a systematic review of relevant literature and a Japanese case study, with the five research sub-objectives (RSs):

RS1: To clarify the definitions of DAO and its nature

RS2: To analyze the impact of DAO on microenterprise management

RS3: To review the banking method for assessing the credit risk of microenterprises

RS4: To analyze the impact of DAO on financial access for microenterprises

RS5: To develop an alternative financing strategy for microenterprises through DAOs

3.2 Research Design

This study adopted a qualitative research approach with both descriptive and explanatory elements to examine the impact of DAO transformation or integration on microenterprise financial access. It also aimed to identify key managerial competencies—such as management philosophy, transparency, efficiency, fairness, scalability, robustness, and sustainability—that may influence this impact.

This study employed a mixed-method approach, including a review of scientific and grey literature, as well as an in-depth interview survey focusing on a Japanese case

study. From April to August 2025, the study was conducted in six stages, aligned with the five research sub-objectives (RSs), as presented in Table 3.1 below.

Table 3.1
Six Research Steps

Research sub-objectives	Type of data	Search period	Data	Main sources
(1) RS1: To clarify the definitions of DAO and its nature	Scientific literature (papers)	April–May 2025	5 papers	Google Scholar, ResearchGate, arXiv, EBSCO, Emerald Insight, CERN Document Server, Consensus, Elicit, SciSpace
(2) RS2: To analyze the impact of DAO on microenterprise management	Grey literature (webpages, social media, Discord, Slack, Notion, and other platforms.)		15 papers 800+ pages	Japan DAO Association (Tokyo, Japan) Metagov (the metaverse) Palo Alto De-Sci Research Lab (Palo Alto, US) Crypto Valley Association (Zug, Switzerland) DeepDAO (Tel-Aviv, Israel) Gaiax (Tokyo, Japan) F6S (London, UK)
(3) RS3: To review the banking method for assessing the credit risk of microenterprises	Scientific literature (papers)	June 2025	55 papers	Google Scholar, ResearchGate, arXiv, EBSCO, Emerald Insight, CERN Document Server, Consensus, Elicit, SciSpace
(4) RS4: To analyze the impact of DAO on financial access for microenterprises	Scientific literature (papers)	July–August 2025	4 papers	Google Scholar, ResearchGate, arXiv, EBSCO, Emerald Insight, CERN Document Server, Consensus, Elicit, SciSpace
(5) RS5: To develop an alternative financing strategy for microenterprises through DAOs	In-depth interview results with DAO LLCs for the case study		7 papers 9 DAO LLCs 25 papers	Japan DAO Association (Tokyo, Japan) Gaiax (Tokyo, Japan) 17 DAO LLCs in Japan
(6) Writing the dissertation (RS1–5)	Scientific literature	August 2025	11 papers	Complementary literature on RS2, RS4, and RS5

Source: Author's own compilation

In preparation for this study between December 2024 and March 2025, the researcher started engaging directly with Japan's emerging DAO ecosystems. This immersive approach was motivated by the need to understand the practical realities of

DAO operations beyond what is available through secondary literature. Specifically, the researcher joined the Japan DAO Association as a sponsoring member, which provided access to legal, technical, and regulatory discussions regarding DAO incorporation and governance within the Japanese context. In addition, the researcher actively participated in several DAO communities through Discord-based platforms. Through these participatory engagements, the researcher gained firsthand insight into the culture, norms, and governance dynamics within these DAO communities.

While this form of embedded research provided valuable insider perspectives, the researcher made sure to stay critical and unbiased. Field notes were kept throughout the engagement process to document observations and reflections. This form of immersive fieldwork enhanced the depth and credibility of this study, especially in such fast-evolving fields as decentralized governance and blockchain-enabled organizational models in Japan.

3.3 Population and Sample

In Japan, there are over 200 DAOs as identified by Gaiax Co. Ltd. and Japan DAO Association in 2024. They are classified into 12 categories (The numbers in parentheses below indicate the number of DAOs): Supporters (72); Social Business (28); Regional Development (25); Social Contribution (21); Creator Economy (17); Joint Creation (13); Gaming Guild (9); Corporate Community (5); Human Resource Management (5); DeSci (4); Learning (4); and Media (1) (Gaiax Co. Ltd., 2024).

However, at this point of time, a questionnaire survey with over 200 DAOs may not be an effective, feasible method for the following two reasons: i) the assumed questionnaire on business management and financing may not be relevant for these over 200 DAOs, most of which are non-profit organizations with various social missions in

Japan; and ii) due to the undeveloped DAO-related statistics without a DAO registration system in Japan, there is no contact list of over 200 DAOs in Japan (Gaiax Co. Ltd., 2025, 2024).

Judging from this research focus on the impact of DAO adoption on business management and financing, the population of interest consisted of DAO-based microenterprise initiatives that had formalized their governance structure through incorporation as limited liability companies and are actively engaged in community-based economic activities.

Since the first legal recognition of DAO LLCs in April 2024, there have been at least 17 DAO LLCs confirmed to exist in Japan (Japan DAO Association, 2024). Of the 17 DAO LLCs, the in-depth interview survey was conducted with the cooperation of nine DAO LLCs, accounting for 53% of all known DAO LLCs in the country. These nine selected DAO LLCs were approached through a combination of DAO-related communities and the researcher's professional networks in Japan.

Regarding the selection criteria, a purposive sampling strategy was employed to select nine DAO LLCs as case study units. Selection criteria included: i) formal incorporation as a DAO LLC in Japan; ii) business with a commercial purpose; iii) evidence of active community participation or financial experimentation (e.g. token issuance, crowdfunding, smart contract-based voting); iv) willingness to participate in this interview survey conducted via online meeting; and v) diversity in location, activity domain, and scale of operation.

3.4 Data Collection and Instrumentation

This case study collected the data through in-depth interviews with nine DAO LLCs in Japan. The interviews were conducted in July 2025, using a video conferencing

tool (primarily Google Meet), with each session lasting approximately 60 to 90 minutes. Each interview was conducted with either a founder or a managing member, or both, depending on availability.

In addition to the initial interviews, follow-up interviews were conducted on a case-by-case basis to obtain clarifications, validate preliminary interpretations, and gather supplementary insights on sensitive managerial issues. This iterative approach allowed the researcher to deepen the understanding of management challenges while ensuring the accuracy and reliability of the data collected.

A semi-structured interview guide was developed to ensure alignment with the research questions (RQs) 2, 4, and 5. The guide consisted of eleven thematic sections:

(1) Business profile: company name; month/year of business establishment; industry type; products/services; prefecture of headquarters; business form (self-employed; JSC; LLC; other); number of employees; registered capital.

(2) Outlines of DAO: name of DAO; month/year of the DAO establishment; form of DAO (DAO without a legal personality, or DAO LLC); pattern of the DAO utilization (transforming into a DAO; integrating parallel with a DAO, or a startup as DAO); purpose of starting the DAO, number of the DAO community members; number of employees at the DAO; market cap of the DAO; founders' share (%) of the DAO ownership.

(3) Effect of DAO on overall fundraising: very small; small; medium; large; very large.

(4) Effect of DAO on managerial competencies: very small; small; medium; large; very large for each of the following factors.

i) Philosophy: visionary shift from a profit-earning center to public entity for the society, ESG, provision of social value, maximizing long-term profits, and other matters.

ii) Transparency: strengthened governance, information disclosure, fraud prevention, visualization of supply chain, and other matters.

iii) Efficiency: reduced decision-making time, reduction of time required for the business collaboration and the operations, and other matters.

iv) Fairness: equal engagement and opportunities for employees and other stakeholders, fair returns for community members (cf. 'reward tokens' similar to stock options in a high-growth startup), and other matters.

v) Scalability: expansion of customer base locally and internationally.

vi) Robustness: strengthened business base supported by fans, community members, stakeholders, and other backers.

vii) Sustainability: business succession, 100-year longevity company, and other matters.

viii) Other factors:

(5) Drivers of the improved financial access: Selection of three key drivers to a better financial access among above-mentioned seven or more factors.

(6) Effect of DAO on loans: very small; small; medium; large; very large.

(7) Detailed data regarding the effect of DAO on loans:

i) Debt Ratio (Total liabilities/Total assets) (decrease; no change; increase)

ii) Ratio of Mid-to-long-term (MLT) Loan to Total Assets (decrease; no change; increase)

iii) Gearing Ratio (Interest-bearing debt/Total shareholder's equity) (decrease; no change; increase)

iv) Type of lender(s) (city bank; regional bank; shinkin bank; credit cooperative; Japan Finance Corporation (JFC); Development Bank of Japan (DBJ); Shoko Chukin Bank; P2P online lender; crowdfunding; DeFi service providers; others)

v) Negotiation power with the lender(s) (weakening; no change; strengthening)

vi) Short-term loans (none; decrease; no change; increase)

vii) Interest rates on short-term loans (increase; no change; decrease)

viii) MLT loans for capital expenditure (CAPEX) (none; decrease; no change; increase)

ix) If the answer is 'increase' on MTL loans for CAPEX, does it require collateral(s)? (yes; no)

x) If 'yes' on the collateral requirement, what are the objects of collateral? (real estate; credit guarantee; others)

xi) If the answer on x) includes credit guarantee, who is the guarantor? (credit guarantee corporation; MSME owner; MSME owner's family member(s), MSME owner's friend(s); others)

(8) Drivers of the enhanced loans: Selection of three key drivers to enhanced bank loans among above-mentioned seven or more factors.

(9) Key success factors for the DAO management: leadership, and other factors.

(10) Challenges in managing a DAO: difficulty in obtaining consent on management issues, lack of leadership, and other challenges.

(11) Financial data in the recent year: the sales; operating profits; ordinary profits; corporate income tax; net profits; interest received; interest expenses; depreciation; dividends; total assets; non-current assets; total liabilities; non-current liabilities; total interest-bearing debt; short-term loans; mid-to-long-term loans; and total shareholder's equity. If the recent financial data is available during or after each in-depth interview, Table 3.2 helps assess the DAOs' financial statements in Japan.

Table 3.2
MSME Management Indicators in Japan

Reference on MSME management indicators by industry type in Japan:
• Sales (in JPY) • Net Profits (in JPY) • Ordinary profits/Sales (%) • Ordinary profits/Total assets (%) • Ordinary profits/Total shareholder's equity (%) • Capital Adequacy Ratio [Total shareholder's equity/Total assets] (%) • Gearing Ratio [Interest-bearing debt/Total shareholder's equity] (%) • Interest Coverage Ratio [Operating Profits + Interest Received & Dividend/Interest Expenses] (%) • Debt Repayment Period [(Interest-bearing debt – Working capital – Bank deposits & Cash)/ (Ordinary profits – Taxes & related charges + Depreciation)] (Years)
Data Source: financial data of 260,898 MSMEs in Japan, TKC BAST Jan–Dec 2024 (FY2025)

Source: Developed by the author based on TKC (2025)

3.5 Data Analysis and Its Limitations

To examine how DAO transformation or integration influences financing accessibility, debt structure, and overall financial stability for the Japanese DAO LLCs, the data analysis is based on the following quantitative and qualitative factors:

(1) Data collection and variables:

i) Dependent variables: debt ratio; gearing ratio; loan acquisition; loan interest rates; diversity of financing sources (i.e. number of different financing sources); and other indicators.

ii) Independent variables: transparency and other DAO-related key features.

iii) Control variables: firm size (number of employees, the sales, total capital); industry type; business history (years since establishment).

(2) Statistical techniques:

i) Factor analysis: Identify key latent factors for better financial access.

ii) Case study comparison: Cross-case analysis of nine Japanese DAO LLCs to highlight best practices and various experiences in DAO management.

(3) Expected outcomes:

i) To demonstrate whether DAO-integrated microenterprises have greater financing opportunities.

ii) To identify which DAO-driven managerial competencies most influence the improvement of financial access.

iii) To provide empirical evidence on a Japanese case study using an interview summary sheet (Table 3.3).

(4) Considerations on data validity and risk:

i) The interview survey needs to focus on Japanese DAO LLCs across different industries and forms/categories to ensure diverse representation of future DAO LLCs.

ii) The collected data may lack sufficient financial information of these DAO LLCs interviewed.

Table 3.3

Interview Summary Sheet for the Japanese Case Study

[Sample] Case 1–9

1. Business Profile and DAO Outline:	2. Financial Indicators:		
Business Profile: Month/year of business establishment Industry type Products/services Prefecture of headquarters Business form (self-employed; Joint-stock company (JSC); limited liability company (LLC); other) Number of employees Registered capital	Sales (in JPY) Net Profits (in JPY) Ordinary profits/Sales (%) Ordinary profits/Total assets (%) Ordinary profits/Total shareholder's equity (%) Capital Adequacy Ratio (%) Gearing Ratio (%) Interest Coverage Ratio (%) Debt Repayment Period (Years)		MSME bench-marks
DAO Outline: Month/year of the DAO establishment Form of DAO (DAO without legal personality; DAO LLC) Pattern of using DAO (transforming into a DAO; integrating in parallel with a DAO; a startup as DAO) Purpose of starting the DAO Number of the DAO community members Number of employees at the DAO Amount of funds raised for the DAO Founders' share (%) of the DAO ownership			

3. Effect of DAO on:		4. Key Success Factors & Management Challenges:
Overall Fundraising: 1. very small; 2. small; 3. medium; 4. large; or 5. very large (5-point scale) Managerial Competencies: Philosophy Transparency Efficiency Fairness Scalability Robustness Sustainability Other ( ) Drivers of Improved Financial Access (selection of 3 key drivers):	1. 2. 3.	Key Success Factors for DAO Management:
Loans: 1. very small; 2. small; 3. medium; 4. large; or 5. very large (5-point scale) Detailed Data on Loans: - Debt ratio (Total liabilities/Total assets) (decrease; no change; increase) - Ratio of mid-to-long-term (MLT) loans to total assets (decrease; no change; increase) - Gearing ratio (Interest-bearing debt/ Total shareholder's equity) (decrease; no change; increase)		Challenges in Managing a DAO:

- Type of lender(s) (city bank; regional bank; shinkin bank; credit cooperative; JFC; DBJ; Shoko Chukin Bank; P2P online lender; crowdfunding; DeFi service provider; others) - Negotiation power with the lender(s) (weakening; no change; strengthening) - Short-term loans (none; decrease; no change; increase) - Interest rates on short-term loans (increase; no change; decrease) - MLT loans for capital expenditure (CAPEX) (none; decrease; no change; increase) - If the answer is 'increase' on MTL loans for CAPEX, does it require collateral(s)? (yes; no) - If 'yes' on the collateral requirement, what are the objects of collateral? (real estate; credit guarantee; others) - If the answer on x) includes credit guarantee, who is the guarantor? (credit guarantee corporation; MSME owner; MSME owner's family member(s), MSME owner's friend(s); others)		
Drivers of Enhanced Loans (selection of 3 key drivers):	1. 2. 3.	

Note: 'Shinkin bank' is a type of cooperative financial institution in Japan, similar to a credit cooperative, primarily serving MSMEs and local residents.
Source: Developed by the author

The interview data, including both the initial interviews and the follow-up interviews, were transcribed. A thematic analysis approach was adopted to identify recurring patterns, similarities, and differences across cases. The inclusion of follow-up interviews provided additional depth, allowing the researcher to validate emerging themes and clarify ambiguous responses on confidential management concerns. This iterative process enhanced the robustness of the findings and ensured that the final analysis reflected the perspectives of the participants with greater accuracy and nuance.

Certain sensitive management challenges raised during the interviews were deliberately excluded from the individual 'Interview Summary Sheets' in order to preserve participant anonymity. Although the sheets were anonymized, there remained a potential risk of identification based on the combination of industry and prefectural

location. To mitigate this risk, such issues were aggregated and discussed in the thesis as overarching challenges shared by most interviewees. This approach ensured both the confidentiality of participants and the ethical integrity of the research process.

3.6 Summary

This chapter has outlined the methodological framework employed in this study to examine how DAO transformation or integration may enhance financial access for microenterprises. The study adopted a qualitative research approach with both descriptive and explanatory elements, while employing a mixed-method approach, including a review of scientific and grey literature, as well as an in-depth interview survey. To prepare for the study, an immersive methodology was also implemented to comprehend the practical aspects of DAO operations.

The in-depth interview survey focused on nine DAO LLCs in Japan—accounting for 53% of all known DAO LLCs in the country—selected for their commercial orientation. The collected data covered a wide range of variables, including business profile, perceived degree of impact of DAO on funding, and key success factors and challenges. The interviews also evaluated the influence of DAO-related factors—such as transparency, scalability, and sustainability—on financial access, loan conditions, and relationships with the banks.

By integrating empirical insights with theoretical analysis, this chapter has laid the foundation for evaluating the impact of DAO on microenterprise management and financing. The findings derived from this methodological approach will be presented in the following chapter, along with the results of the Japanese case study.

CHAPTER IV:

RESULTS

4.1 Introduction

Building on the methodological approach described in the previous chapter, this chapter presents the empirical findings of this case study, based on in-depth interviews with nine DAO LLCs (i.e. microenterprises transforming into or integrating with a DAO, or startups as DAO) operating in Japan.

This study aims to investigate the impact of DAOs on managerial capabilities and financial accessibility within microenterprises. The presentation of the key findings is structured by the research questions (RQs), with an emphasis on identifying patterns among the nine cases (e.g., funding mechanisms, governance models, operational outcomes), commonalities, and differences.

To strengthen the findings, this chapter integrates interview summary sheets, illustrative tables, and complementary descriptions confirmed by the interviews and follow-up immerse fieldwork. Each case summary sheet highlights organizational characteristics, governance practices, financing challenges, and success factors, followed by a cross-case synthesis. The emphasis is placed on understanding what was observed in the case study.

4.2 Organization of Data Analysis

Data preparation and transcription: all interviews were documented with the consent of the interviewees and then transcribed onto the Interview Summary Sheet (Table 3.3), including four analytical categories: i) business profile and DAO outline; ii) financial indicators; iii) effect of DAO on fundraising and managerial competencies; and iv) key success factors and management challenges. Where responses were in Japanese,

translation into English was conducted to ensure consistency across the data. Transcripts were reviewed and cleaned to remove fillers and off-topic content while maintaining the integrity of interviewee responses. Each case was assigned a code name (e.g. 'Case 1') in order to ensure the anonymity of the DAO LLCs that participated in the interviews.

Cross-case comparison: once thematic categories were developed for each case, a cross-case analysis was conducted to identify commonalities and differences across DAO LLCs. This process helped highlight patterns in governance design, financing practices, challenges faced, and engagement with traditional institutions. Comparative matrices were created to map each DAO's characteristics, allowing for pattern matching across cases. This facilitated deeper insights into how structural and contextual factors shape the design and effectiveness of DAO-based financing models.

Ensuring trustworthiness: several strategies were employed to enhance the credibility of the data analysis. Triangulation was achieved by comparing interview data with publicly available information (e.g. DAO websites, whitepapers, press coverage) and internal information (e.g. Discord-based community). The overall approach to data analysis was designed to balance structure and flexibility, enabling the discovery of nuanced insights while preserving the authenticity of participant experiences.

4.3 Summary of Interview Data

A summary table for each case is provided below (see Tables 4.1–4.8). It includes key organizational attributes, the effect of DAO on fundraising and managerial competencies, key success factors, and management challenges. These summaries serve as the primary data source for the thematic and cross-case analyzes.

Table 4.1
Interview Summary Sheet: Case 1

Case 1

1. Business Profile and DAO Outline:

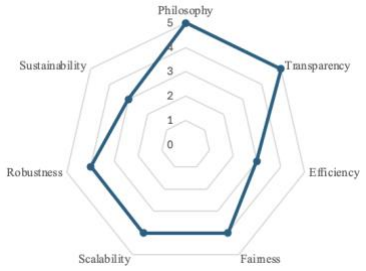
Business Profile:
- Month/year of business establishment: February 2018
- Industry type: import and sales
- Products/services: Indian coffee and food & beverage
- Prefecture of headquarters: Yamaguchi
- Business form: JSC
- Number of employees: 0
- Registered capital: JPY 3 million

DAO Outline:
- Month/year of the DAO establishment: July 2024
- Form of DAO: DAO LLC
- Pattern of using DAO: integrating in parallel with a DAO
- Purpose of starting the DAO: coffee grounds exchange
- Number of the DAO community members: 86
- Number of employees at the DAO: 0
- Amount of funds raised for the DAO: 0
- Founders' share (%) of the DAO ownership: –

2. Financial Indicators:

		MSME bench-marks
Sales (in JPY)		
Net Profits (in JPY)		
Ordinary profits/Sales (%)		
Ordinary profits/Total assets (%)		
Ordinary profits/Total shareholder's equity (%)		
Capital Adequacy Ratio (%)		
Gearing Ratio (%)		
Interest Coverage Ratio (%)		
Debt Repayment Period (Years)		
n.a. (the financial statements of first fiscal year in preparation)		

3. Effect of DAO on:

Overall Fundraising: 1. very small; 2. small; 3. medium; 4. large; or 5. very large (5-point scale)	4 (large)
Managerial Competencies:  	Apart from the 7 competencies, 'other (data-backed learning)' is rated #4.
Drivers of Improved Financial Access (selection of 3 key drivers):	1. Transparency 2. Fairness 3. Scalability
Loans: 1. very small; 2. small; 3. medium; 4. large; or 5. very large (5-point scale)	3 (medium)
Detailed Data on Loans:	
- Debt ratio (Total liabilities/Total assets) (decrease; no change; increase)	increase
- Ratio of mid-to-long-term (MLT) loans to total assets (decrease; no change; increase)	increase

4. Key Success Factors & Management Challenges:

Key Success Factors for DAO Management:
- A highly motivated founder with a clear vision to solve the serious social challenge (i.e. the Coffee 2050 problem) for the coffee industry in the world.
- Involving the various stakeholders in coffee industry as an essential part of this project.
- Taking advantage of adopting a DAO that fits this business.
- Transparent governance
- Budling strategic partnerships with Web3 companies, an incubator, a Japanese expert on tokenomics, a city government in a Japanese prefecture, etc.
- Establishing a feasible revenue model within the DAO-initiated ecosystem of coffee supply chain.

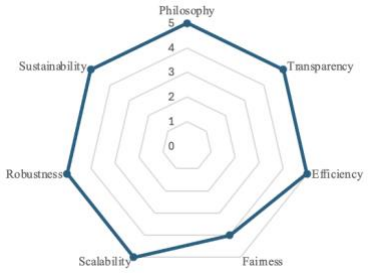
Challenges in Managing a DAO:
- Ensuring the initial funds for the DAO's initiative and stably obtaining mid-to-long-term loans for working capital, as well as government subsidy.

- Gearing ratio (Interest-bearing debt/ Total shareholder's equity) (decrease; no change; increase)	no change	
- Type of lender(s) (city bank; regional bank; shinkin bank; credit cooperative; JFC; DBJ; Shoko Chukin Bank; P2P online lender; crowdfunding; DeFi service provider; others)	regional bank; JFC, DeFi service provider	
- Negotiation power with the lender(s) (weakening; no change; strengthening)	strengthening	
- Short-term loans (none; decrease; no change; increase)	none	
- Interest rates on short-term loans (increase; no change; decrease)	–	
- MLT loans for capital expenditure (CAPEX) (none; decrease; no change; increase)	none	
- If the answer is 'increase' on MTL loans for CAPEX, does it require collateral(s)? (yes; no)	–	
- If 'yes' on the collateral requirement, what are the objects of collateral? (real estate; credit guarantee; others)	–	
- If the answer on x) includes credit guarantee, who is the guarantor? (credit guarantee corporation; MSME owner; MSME owner's family member(s), MSME owner's friend(s); others)	–	
Drivers of Enhanced Loans (selection of 3 key drivers):	1. Robustness 2. Transparency 3. Scalability	

Note: Sensitive management challenges are not included in the summary sheets to preserve anonymity.
Source: Author's compilation based on an interview with a founder of Case 1 (2025)

Table 4.2
Interview Summary Sheet: Case 2

Case 2

1. Business Profile and DAO Outline:		2. Financial Indicators:		
Business Profile: Month/year of business establishment: – Industry type: – Products/services: – Prefecture of headquarters: – Business form: – Number of employees: – Registered capital: –				MSME bench-marks
DAO Outline: Month/year of the DAO establishment: August 2024 Form of DAO: DAO LLC Pattern of using DAO: a startup as DAO Purpose of starting the DAO: management of old fork hotel on an island in Kagawa prefecture Number of the DAO community members: 584 Number of employees at the DAO: 0 Amount of funds raised for the DAO: JPY 18 million Founders' share (%) of the DAO ownership: about 5%		Sales (in JPY) Net Profits (in JPY) Ordinary profits/Sales (%) Ordinary profits/Total assets (%) Ordinary profits/Total shareholder's equity (%) Capital Adequacy Ratio (%) Gearing Ratio (%) Interest Coverage Ratio (%) Debt Repayment Period (Years) n.a. (the financial statements of first fiscal year in preparation)		
3. Effect of DAO on:		4. Key Success Factors & Management Challenges:		
Overall Fundraising: 1. very small; 2. small; 3. medium; 4. large; or 5. very large (5-point scale)	5 (very large)	Key Success Factors for DAO Management: - Great initiative of the founder as a visionary, cultural entrepreneur. - Socially, culturally, economically impactful objective of the business - Superior business model built by four founding executive directors, including a legal expert on DAO in Japan, which provides investor confidence - Intensive network with the local community as well as the local government. (cf. The total number of investors is about 80.) - A clear roadmap with rational, long-term strategies and appropriate KPIs.		
Managerial Competencies:  				
Drivers of Improved Financial Access (selection of 3 key drivers):	1. Philosophy 2. Sustainability 3. Transparency			
Loans: 1. very small; 2. small; 3. medium; 4. large; or 5. very large (5-point scale)	5 (very large)	Challenges in Managing a DAO: - Sustainable fundraising depending on the business expansion in Japan and globally. The target amount of fundraising is JPY 40 million. - Obtaining working capital loans. In the initial stage, the reason of rejection on a loan application was the operational risk that the decision-making rights of founders were likely to be diluted by increasing the number of voting rights holders within the DAO.		
Detailed Data on Loans: - Debt ratio (Total liabilities/Total assets) (decrease; no change; increase)	decrease			
- Ratio of mid-to-long-term (MLT) loans to total assets (decrease; no change; increase)	decrease			

- Gearing ratio (Interest-bearing debt/ Total shareholder's equity) (decrease; no change; increase)	decrease	
- Type of lender(s) (city bank; regional bank; shinkin bank; credit cooperative; JFC; DBJ; Shoko Chukin Bank; P2P online lender; crowdfunding; DeFi service provider; others)	regional bank; JFC, crowdfunding, DeFi service provider	
- Negotiation power with the lender(s) (weakening; no change; strengthening)	weakening	
- Short-term loans (none; decrease; no change; increase)	none	
- Interest rates on short-term loans (increase; no change; decrease)	–	
- MLT loans for capital expenditure (CAPEX) (none; decrease; no change; increase)	none	
- If the answer is 'increase' on MTL loans for CAPEX, does it require collateral(s)? (yes; no)	–	
- If 'yes' on the collateral requirement, what are the objects of collateral? (real estate; credit guarantee; others)	–	
- If the answer on x) includes credit guarantee, who is the guarantor? (credit guarantee corporation; MSME owner; MSME owner's family member(s), MSME owner's friend(s); others)	–	
Drivers of Enhanced Loans (selection of 3 key drivers):	1. Efficiency 2. Robustness 3. Scalability	

Note: Sensitive management challenges are not included in the summary sheets to preserve anonymity.
Source: Author's compilation based on an interview with a founder of Case 2 (2025)

Table 4.3
Interview Summary Sheet: Case 3 and Case 4

Case 3 and Case 4

1. Business Profile and DAO Outline:

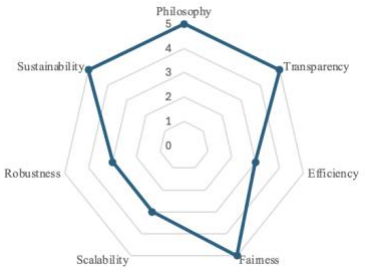
Business Profile:
- Month/year of business establishment: July 2017
- Industry type: hotel and other type of services
- Products/services: hotel, employee training
- Prefecture of headquarters: Miyagi
- Business form: JSC
- Number of employees: 7
- Registered capital: JPY 50 million

DAO Outline:
- Month/year of the DAO establishment: April 2025 (Case 3); May 2025 (Case 4)
- Form of DAO: DAO LLC
- Pattern of using DAO: integrating in parallel with a DAO
- Purpose of starting the DAO: establishing a smart eco-village in a city in Miyagi prefecture, including disaster prevention training (Case 3), the reduction of food losses (oyster) (Case 4), etc.
- Number of the DAO community members: 862
- Number of employees at the DAO: 0
- Amount of funds raised for the DAO: 0
- Founders' share (%) of the DAO ownership: –

2. Financial Indicators:

		MSME bench-marks
Sales (in JPY)		
Net Profits (in JPY)		
Ordinary profits/Sales (%)		
Ordinary profits/Total assets (%)		
Ordinary profits/Total shareholder's equity (%)		
Capital Adequacy Ratio (%)		
Gearing Ratio (%)		
Interest Coverage Ratio (%)		
Debt Repayment Period (Years)		
n.a (the first fiscal year has not yet ended)		

3. Effect of DAO on:

Overall Fundraising: 1. very small; 2. small; 3. medium; 4. large; or 5. very large (5-point scale)	3 (medium)
Managerial Competencies:  	
Drivers of Improved Financial Access (selection of 3 key drivers):	1. Transparency 2. Sustainability 3. Efficiency
Loans: 1. very small; 2. small; 3. medium; 4. large; or 5. very large (5-point scale)	2 (small)
Detailed Data on Loans: - Debt ratio (Total liabilities/Total assets) (decrease; no change; increase)	decrease

4. Key Success Factors & Management Challenges:

Key Success Factors for DAO Management:
- A visionary, passionate entrepreneur with a great concept of 12 elements on SDGs.
- A socially sympathetic vision to rebuild a local town and the community after the Great Japan East Earthquake 2011.
- Receiving supports through solid partnerships with the local community and government.

Challenges in Managing a DAO:
- Initial fundraising through the sales of NFTs (scheduled for August–September 2025).
- Sustainable funding from a long-term viewpoint of long-life business as a local community's common property.

- Ratio of mid-to-long-term (MLT) loans to total assets (decrease; no change; increase)	decrease	
- Gearing ratio (Interest-bearing debt/ Total shareholder's equity) (decrease; no change; increase)	decrease	
- Type of lender(s) (city bank; regional bank; shinkin bank; credit cooperative; JFC; DBJ; Shoko Chukin Bank; P2P online lender; crowdfunding; DeFi service provider; others)	regional bank; crowdfunding	
- Negotiation power with the lender(s) (weakening; no change; strengthening)	no change	
- Short-term loans (none; decrease; no change; increase)	none	
- Interest rates on short-term loans (increase; no change; decrease)	–	
- MLT loans for capital expenditure (CAPEX) (none; decrease; no change; increase)	none	
- If the answer is 'increase' on MTL loans for CAPEX, does it require collateral(s)? (yes; no)	–	
- If 'yes' on the collateral requirement, what are the objects of collateral? (real estate; credit guarantee; others)	–	
- If the answer on x) includes credit guarantee, who is the guarantor? (credit guarantee corporation; MSME owner; MSME owner's family member(s), MSME owner's friend(s); others)	–	
Drivers of Enhanced Loans (selection of 3 key drivers):	1. Transparency 2. Sustainability 3. Robustness	

Note: 1. 'Business profile' in this table refers to the parent company of both Case 3 and Case 4. All other questions (except month/year of the DAO establishment and purpose of starting the DAO) were answered identically by the interviewees of both cases.

2. Sensitive management challenges are not included in the summary sheets to preserve anonymity.

Source: Author's compilation based on an interview with a founder and a managing member of both Case 3 and Case 4 (2025)

Table 4.4
Interview Summary Sheet: Case 5

Case 5

1. Business Profile and DAO Outline:

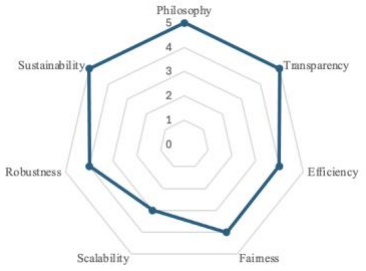
Business Profile:
- Month/year of business establishment: August 2011
- Industry type: other type of services
- Products/services: IT/web system development
- Prefecture of headquarters: Nagasaki
- Business form: JSC
- Number of employees: 30
- Registered capital: JPY 30 million

DAO Outline:
- Month/year of the DAO establishment: November 2024
- Form of DAO: DAO LLC
- Pattern of using DAO: transforming into a DAO
- Purpose of starting the DAO: business support on Digital Transformation (DX), 3D metaverse, etc.
- Number of the DAO community members: 20
- Number of employees at the DAO: 0
- Amount of funds raised for the DAO: 0
- Founders' share (%) of the DAO ownership: –

2. Financial Indicators:

		MSME bench-marks
Sales (in JPY)		
Net Profits (in JPY)		
Ordinary profits/Sales (%)		
Ordinary profits/Total assets (%)		
Ordinary profits/Total shareholder's equity (%)		
Capital Adequacy Ratio (%)		
Gearing Ratio (%)		
Interest Coverage Ratio (%)		
Debt Repayment Period (Years)		
n.a. (the first fiscal year has not yet ended)		

3. Effect of DAO on:

Overall Fundraising: 1. very small; 2. small; 3. medium; 4. large; or 5. very large (5-point scale)	1 (very small)
Managerial Competencies:  	Apart from the 7 competencies, 'other (profitability)' is rated #5.
Drivers of Improved Financial Access (selection of 3 key drivers):	1. Scalability 2. Sustainability 3. Transparency
Loans 1. very small; 2. small; 3. medium; 4. large; or 5. very large (5-point scale)	5 (very large)
Detailed Data on Loans:	
- Debt ratio (Total liabilities/Total assets) (decrease; no change; increase)	decrease
- Ratio of mid-to-long-term (MLT) loans to total assets (decrease; no change; increase)	no change

4. Key Success Factors & Management Challenges:

Key Success Factors for DAO Management:
- The founder's strong initiative to be transformed into a DAO LLC firstly in Japan.
- The founder's extensive experience in DX and blockchain technology.
- Minimization of fixed costs, including such employment costs and other administration cost (e.g. The office is no longer needed.). Especially, dramatical reduction of the employment costs, including salaries, benefits, social insurance, commuting allowance, etc.
- Establishment of a DAO foundation to invest into bonds and others for financial stability.
- Obtaining a synergy effect by operating a smart agricultural village and other SDGs-friendly facilities.

Challenges in Managing a DAO:
- Building a management team by securing talents who can play a role as a coach and facilitator within a DAO business.
- Time-consuming procedure for issuing the membership interest tokens.
- Prevention of internal information leaks and any other legal violations.

- Gearing ratio (Interest-bearing debt/ Total shareholder's equity) (decrease; no change; increase)	no change	
- Type of lender(s) (city bank; regional bank; shinkin bank; credit cooperative; JFC; DBJ; Shoko Chukin Bank; P2P online lender; crowdfunding; DeFi service provider; others)	regional bank; JFC; Shoko Chukin Bank	
- Negotiation power with the lender(s) (weakening; no change; strengthening)	no change	
- Short-term loans (none; decrease; no change; increase)	no change	
- Interest rates on short-term loans (increase; no change; decrease)	no change	
- MLT loans for capital expenditure (CAPEX) (none; decrease; no change; increase)	no change	
- If the answer is 'increase' on MTL loans for CAPEX, does it require collateral(s)? (yes; no)	–	
- If 'yes' on the collateral requirement, what are the objects of collateral? (real estate; credit guarantee; others)	–	
- If the answer on x) includes credit guarantee, who is the guarantor? (credit guarantee corporation; MSME owner; MSME owner's family member(s), MSME owner's friend(s); others)	–	
Drivers of Enhanced Loans (selection of 3 key drivers):	1. Scalability 2. Sustainability 3. Transparency	

Note: Sensitive management challenges are not included in the summary sheets to preserve anonymity.
Source: Author's compilation based on an interview with a founder of Case 5 (2025)

Table 4.5
Interview Summary Sheet: Case 6

Case 6

1. Business Profile and DAO Outline:

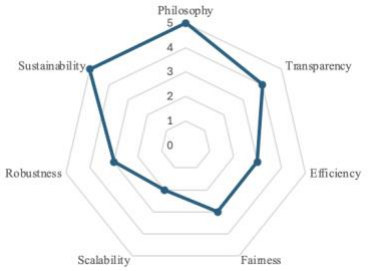
Business Profile:
- Month/year of business establishment: December 2018
- Industry type: hotel and other type of services
- Products/services: consulting on Web3 and blockchain
- Prefecture of headquarters: Tokyo
- Business form: JSC
- Number of employees: 10
- Registered capital: JPY 50 million

DAO Outline:
- Month/year of the DAO establishment: August 2024
- Form of DAO: DAO LLC
- Pattern of using DAO: integrating in parallel with a DAO
- Purpose of starting the DAO: providing experience value for inbound tourists from overseas
- Number of the DAO community members: 410
- Number of employees at the DAO: 0
- Amount of funds raised for the DAO: 0
- Founders' share (%) of the DAO ownership: –

2. Financial Indicators:

		MSME bench-marks
Sales (in JPY)		
Net Profits (in JPY)		
Ordinary profits/Sales (%)		
Ordinary profits/Total assets (%)		
Ordinary profits/Total shareholder's equity (%)		
Capital Adequacy Ratio (%)		
Gearing Ratio (%)		
Interest Coverage Ratio (%)		
Debt Repayment Period (Years)		
n.a. (the financial statements of first fiscal year in preparation)		

3. Effect of DAO on:

Overall Fundraising: 1. very small; 2. small; 3. medium; 4. large; or 5. very large (5-point scale)	3 (medium)
Managerial Competencies:  	
Drivers of Improved Financial Access (selection of 3 key drivers):	1. Philosophy 2. Transparency 3. Sustainability
Loans: 1. very small; 2. small; 3. medium; 4. large; or 5. very large (5-point scale)	3 (medium)
Detailed Data on Loans:	
- Debt ratio (Total liabilities/Total assets) (decrease; no change; increase)	no change
- Ratio of mid-to-long-term (MLT) loans to total assets (decrease; no change; increase)	no change

4. Key Success Factors & Management Challenges:

Key Success Factors for DAO Management:
- The business founder's strong initiative to use DAO LLC as a leading case in Japan.
- Leveraging lessons from several advanced blockchain-based initiatives in Japan.

Challenges in Managing a DAO:
- Expanding the sales of NFTs to potential community members such as overseas and Japanese tourists.

- Gearing ratio (Interest-bearing debt/ Total shareholder's equity) (decrease; no change; increase)	no change	
- Type of lender(s) (city bank; regional bank; shinkin bank; credit cooperative; JFC; DBJ; Shoko Chukin Bank; P2P online lender; crowdfunding; DeFi service provider; others)	–	
- Negotiation power with the lender(s) (weakening; no change; strengthening)	weakening	
- Short-term loans (none; decrease; no change; increase)	none	
- Interest rates on short-term loans (increase; no change; decrease)	–	
- MLT loans for capital expenditure (CAPEX) (none; decrease; no change; increase)	no change	
- If the answer is 'increase' on MTL loans for CAPEX, does it require collateral(s)? (yes; no)	–	
- If 'yes' on the collateral requirement, what are the objects of collateral? (real estate; credit guarantee; others)	–	
- If the answer on x) includes credit guarantee, who is the guarantor? (credit guarantee corporation; MSME owner; MSME owner's family member(s), MSME owner's friend(s); others)	–	
Drivers of Enhanced Loans (selection of 3 key drivers):	1. Scalability 2. Sustainability 3. Philosophy	

Note: Sensitive management challenges are not included in the summary sheets to preserve anonymity.
Source: Author's compilation based on an interview with a managing member of Case 6 (2025)

Table 4.6
Interview Summary Sheet: Case 7

Case 7

1. Business Profile and DAO Outline:

Business Profile:
- Month/year of business establishment: March 2015
- Industry type: real estate rental
- Products/services: shared house and guest house
- Prefecture of headquarters: Miyagi
- Business form: JSC
- Number of employees: 6
- Registered capital: JPY 16.1 million

DAO Outline:
- Month/year of the DAO establishment: September 2024
- Form of DAO: DAO LLC
- Pattern of using DAO: integrating in parallel with a DAO
- Purpose of starting the DAO: operations of shared house
- Number of the DAO community members: 612
- Number of employees at the DAO: 0
- Amount of funds raised for the DAO: 0
- Founders' share (%) of the DAO ownership: –

2. Financial Indicators:

		MSME bench-marks
Sales (in JPY)		
Net Profits (in JPY)		
Ordinary profits/Sales (%)		
Ordinary profits/Total assets (%)		
Ordinary profits/Total shareholder's equity (%)		
Capital Adequacy Ratio (%)		
Gearing Ratio (%)		
Interest Coverage Ratio (%)		
Debt Repayment Period (Years)		
n.a (the first fiscal year has not yet ended)		

3. Effect of DAO on:

Overall Fundraising: 1. very small; 2. small; 3. medium; 4. large; or 5. very large (5-point scale)	5 (very large)
Managerial Competencies:  	
Drivers of Improved Financial Access (selection of 3 key drivers):	1. Scalability 2. Philosophy 3. Efficiency
Loans: 1. very small; 2. small; 3. medium; 4. large; or 5. very large (5-point scale)	5 (very large)
Detailed Data on Loans:	
- Debt ratio (Total liabilities/Total assets) (decrease; no change; increase)	decrease
- Ratio of mid-to-long-term (MLT) loans to total assets (decrease; no change; increase)	decrease

4. Key Success Factors & Management Challenges:

Key Success Factors for DAO Management:
- The visionary leader's great initiative to start a DAO-based project in the real estate industry firstly in Japan.
- Responding to the needs of young people for new lifestyles, such as living in multiple locations and 'staycation' (i.e. stay x vacation) in Japan.

Challenges in Managing a DAO:
- Maintaining the commitment and motivation from the community members, particularly core members for several reasons (e.g. 'Reward tokens' might be difficult to put the distributed tokens into a liquidity pool in Japan.)
- Rethinking of the transformed form of 'DAO LLC' back into a 'DAO' without legal personality. The major reason lies in the higher costs associated with the operations of a DAO LLC and the doubts about the real necessity of the DAO LLC form for the business nature and purposes.

- Gearing ratio (Interest-bearing debt/ Total shareholder's equity) (decrease; no change; increase)	decrease	
- Type of lender(s) (city bank; regional bank; shinkin bank; credit cooperative; JFC; DBJ; Shoko Chukin Bank; P2P online lender; crowdfunding; DeFi service provider; others)	city bank; regional bank; shinkin bank; credit cooperative; JFC; crowdfunding	
- Negotiation power with the lender(s) (weakening; no change; strengthening)	no change	
- Short-term loans (none; decrease; no change; increase)	none	
- Interest rates on short-term loans (increase; no change; decrease)	–	
- MLT loans for capital expenditure (CAPEX) (none; decrease; no change; increase)	none	
- If the answer is 'increase' on MTL loans for CAPEX, does it require collateral(s)? (yes; no)	–	
- If 'yes' on the collateral requirement, what are the objects of collateral? (real estate; credit guarantee; others)	–	
- If the answer on x) includes credit guarantee, who is the guarantor? (credit guarantee corporation; MSME owner; MSME owner's family member(s), MSME owner's friend(s); others)	–	
Drivers of Enhanced Loans (selection of 3 key drivers):	1. Scalability 2. Sustainability 3. Efficiency	

Note: 1. 'Shinkin bank' is a type of cooperative financial institution in Japan, similar to a credit cooperative, primarily serving MSMEs and local residents.

2. Sensitive management challenges are not included in the summary sheets to preserve anonymity.

Source: Author's compilation based on an interview with a managing member of Case 7 (2025)

Table 4.7
Interview Summary Sheet: Case 8

Case 8

1. Business Profile and DAO Outline:

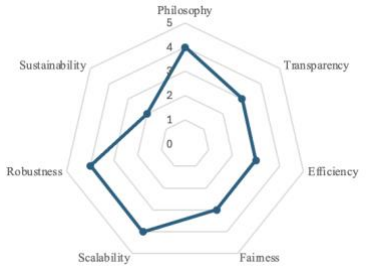
Business Profile:
- Month/year of business establishment: July 2021
- Industry type: IT system developer
- Products/services: AI-backed system/app development
- Prefecture of headquarters: Nagasaki
- Business form: self-employed
- Number of employees: 0
- Registered capital: –

DAO Outline:
- Month/year of the DAO establishment: July 2024
- Form of DAO: DAO LLC
- Pattern of using DAO: a startup as DAO
- Purpose of starting the DAO: matching app development
- Number of the DAO community members: –
- Number of employees at the DAO: 0
- Amount of funds raised for the DAO: 0
- Founders' share (%) of the DAO ownership: –

2. Financial Indicators:

		MSME bench-marks
Sales (in JPY)		
Net Profits (in JPY)		
Ordinary profits/Sales (%)		
Ordinary profits/Total assets (%)		
Ordinary profits/Total shareholder's equity (%)		
Capital Adequacy Ratio (%)		
Gearing Ratio (%)		
Interest Coverage Ratio (%)		
Debt Repayment Period (Years)		
n.a. (the financial statements of first fiscal year in preparation)		

3. Effect of DAO on:

Overall Fundraising: 1. very small; 2. small; 3. medium; 4. large; or 5. very large (5-point scale)	2 (small)
Managerial Competencies:  	
Drivers of Improved Financial Access (selection of 3 key drivers):	1. Philosophy 2. Robustness 3. Scalability
Loans: 1. very small; 2. small; 3. medium; 4. large; or 5. very large (5-point scale)	1 (very small)
Detailed Data on Loans:	
- Debt ratio (Total liabilities/Total assets) (decrease; no change; increase)	no change
- Ratio of mid-to-long-term (MLT) loans to total assets (decrease; no change; increase)	no change

4. Key Success Factors & Management Challenges:

Key Success Factors for DAO Management:

- Smooth operations of a DAO LLC, based on previous self-employed business in digital platform development, AI-backed system/app, lecturing at a university in Japan, etc.
- Effective networking through the founder's contributions to social, economic development in Nagasaki.

Challenges in Managing a DAO:

- Establishing a new DAO LLC in JV form in the future, where corporate partners can collaborate efficiently and effectively.

- Gearing ratio (Interest-bearing debt/ Total shareholder's equity) (decrease; no change; increase)	no change	
- Type of lender(s) (city bank; regional bank; shinkin bank; credit cooperative; JFC; DBJ; Shoko Chukin Bank; P2P online lender; crowdfunding; DeFi service provider; others)	regional bank; others (online bank)	
- Negotiation power with the lender(s) (weakening; no change; strengthening)	no change	
- Short-term loans (none; decrease; no change; increase)	none	
- Interest rates on short-term loans (increase; no change; decrease)	–	
- MLT loans for capital expenditure (CAPEX) (none; decrease; no change; increase)	none	
- If the answer is 'increase' on MTL loans for CAPEX, does it require collateral(s)? (yes; no)	–	
- If 'yes' on the collateral requirement, what are the objects of collateral? (real estate; credit guarantee; others)	–	
- If the answer on x) includes credit guarantee, who is the guarantor? (credit guarantee corporation; MSME owner; MSME owner's family member(s), MSME owner's friend(s); others)	–	
Drivers of Enhanced Loans (selection of 3 key drivers):	1. Robustness 2. Efficiency 3. Transparency	

Note: Sensitive management challenges are not included in the summary sheets to preserve anonymity.
Source: Author's compilation based on an interview with a founder of Case 8 (2025)

Table 4.8
Interview Summary Sheet: Case 9

Case 9

1. Business Profile and DAO Outline:

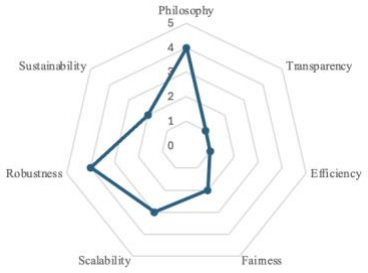
Business Profile:
- Month/year of business establishment: October 2023
- Industry type: other type of services
- Products/services: social issue solving, event organizing
- Prefecture of headquarters: Osaka
- Business form: limited liability company
- Number of employees: n.a.
- Registered capital: JPY 1 million

DAO Outline:
- Month/year of the DAO establishment: April 2024
- Form of DAO: DAO LLC
- Pattern of using DAO: transforming into a DAO
- Purpose of starting the DAO: social issue solving, event organizer, video production & editing
- Number of the DAO community members: n.a.
- Number of employees at the DAO: 0
- Amount of funds raised for the DAO: 0
- Founders' share (%) of the DAO ownership: –

2. Financial Indicators:

		MSME bench-marks
Sales (in JPY)		
Net Profits (in JPY)		
Ordinary profits/Sales (%)		
Ordinary profits/Total assets (%)		
Ordinary profits/Total shareholder's equity (%)		
Capital Adequacy Ratio (%)		
Gearing Ratio (%)		
Interest Coverage Ratio (%)		
Debt Repayment Period (Years)		
n.a. (the first full fiscal year [October 2024 - September 2025] has not yet ended)		

3. Effect of DAO on:

Overall Fundraising: 1. very small; 2. small; 3. medium; 4. large; or 5. very large (5-point scale)	1 (very small)
Managerial Competencies:  	Apart from the 7 competencies, 'other (HRD)' is rated #4.
Drivers of Improved Financial Access (selection of 3 key drivers):	1. Scalability 2. Robustness 3. Philosophy
Loans: 1. very small; 2. small; 3. medium; 4. large; or 5. very large (5-point scale)	1 (very small)
Detailed Data on Loans:	
- Debt ratio (Total liabilities/Total assets) (decrease; no change; increase)	no change
- Ratio of mid-to-long-term (MLT) loans to total assets (decrease; no change; increase)	no change

4. Key Success Factors & Management Challenges:

Key Success Factors for DAO Management:

- The founders' clear vision and great initiatives to solve social issues in Japan (e.g. ecosystem-building for donation; solving the vacant house problem; fostering social entrepreneurs).
- Taking advantage of community members who have grown through challenging, cutting-edge DAO businesses.

Challenges in Managing a DAO:

- Profitability improvement and sustainable financing for the long-term operations of the DAO LLC.

- Gearing ratio (Interest-bearing debt /Total shareholder's equity) (decrease; no change; increase)	no change	
- Type of lender(s) (city bank; regional bank; shinkin bank; credit cooperative; JFC; DBJ; Shoko Chukin Bank; P2P online lender; crowdfunding; DeFi service provider; others)	regional bank	
- Negotiation power with the lender(s) (weakening; no change; strengthening)	no change	
- Short-term loans (none; decrease; no change; increase)	none	
- Interest rates on short-term loans (increase; no change; decrease)	–	
- MLT loans for capital expenditure (CAPEX) (none; decrease; no change; increase)	none	
- If the answer is 'increase' on MTL loans for CAPEX, does it require collateral(s)? (yes; no)	–	
- If 'yes' on the collateral requirement, what are the objects of collateral? (real estate; credit guarantee; others)	–	
- If the answer on x) includes credit guarantee, who is the guarantor? (credit guarantee corporation; MSME owner; MSME owner's family member(s), MSME owner's friend(s); others)	–	
Drivers of Enhanced Loans (selection of 3 key drivers):	1. Robustness 2. Scalability 3. Philosophy	

Note: Sensitive management challenges are not included in the summary sheets to preserve anonymity.
Source: Author's compilation based on an interview with a founder of Case 9 (2025)

4.4 Findings Regarding Each Research Question

Table 4.9 summarizes the basic profiles of the nine DAO LLCs that participated in the interviews, representing 53% of all known DAO LLCs in Japan as of mid-2025. It shows a diverse of microenterprises across various sectors and different regions in Japan. This diversity provides a comparative basis for examining differences in business performance, governance, and access to finance.

However, because Japan legally recognized DAO LLCs first in April 2024, all the participating DAO LLCs are classified as early-stage microenterprises or startups, having operated for about one and a half years or less and without employees. They appear to be in a transitional stage of strengthening their management systems towards a desirable DAO management, while facing typical management and financing access challenges that ordinary startups/MSMEs also have in Japan.

Table 4.9
Overview of the Nine DAO LLCs Interviewed in the Case Study

Category	Response distribution (N = 9)
Business history	Less than 1 year (n = 4) 1–2 years (n = 5)
Business sector	Regional development (n = 2) Real estate (n = 1) Hotel (n = 1) Tourism (n = 1) Agriculture (n = 1) Digital transformation (DX) (n = 1) AI (n = 1) Social contribution (n = 1)
Business location (Prefecture in Japan)	Miyagi (n = 3) Nagasaki (n = 2) Tokyo (n = 1) Osaka (n = 1) Fukuoka (n = 1) Kagawa (n = 1)
DAO integration pattern	Operated in parallel with a DAO (n = 5) Transformed into a DAO (n = 2) Founded DAO as a startup (n = 2)
Number of community members	Fewer than 50 (n = 4) 50–100 (n = 0) 100–500 (n = 1) More than 500 (n = 4)
Amount of community-based funding raised	Less than JPY 10 million (n = 8) JPY 10–50 million (n = 1) More than JPY 50 million (n = 0)

Source: Author's own compilation

Key findings from these nine Japanese cases were presented below, focusing specifically on the research questions (RQs) 2, 4, and 5.

Research question (RQ) 2: how does DAO affect microenterprise management?: Across the nine DAO LLCs in Japan, DAO transformation or integration significantly influenced managerial competencies in the following ways. Among 7 possible managerial competencies (i.e. philosophy, transparency, efficiency, fairness, scalability, robustness, and sustainability) discussed in previous studies, the most of interviewees recognized 'philosophy', 'transparency' and 'sustainability' as significantly improved competencies by adopting a DAO (Table 4.10).

- *Philosophy*: philosophy was cited by 9 out of 9 interviewees as significantly improved, contributing to obtaining stakeholder trust.
- *Transparency*: 6 out of 9 interviewees indicated enhanced transparency through open records, decision-making logs, and token-holder voting systems, increasing trust among stakeholders and improving community participation.
- *Sustainability*: 6 out of 9 interviewees emphasized enhanced sustainability or long-term focus enabled by DAO governance, as token-holding communities will be able to promote continuity beyond founder leadership.
- *Fairness*: more equitable engagement was noted by 5 out of 9 interviewees, especially through token-based reward systems, which ensured stakeholder inclusivity so that contributions were recognized regardless of hierarchy. However, the challenges included governance complexity and the need for governance literacy.
- *Robustness*: positive changes in robustness were observed in five cases.
- *Efficiency and scalability*: positive changes in efficiency and scalability were observed in only a few cases (e.g. decision-making speed, shortened decision-making cycles, and reduced bureaucratic hurdles, backed by smart contract automation, borderless participation, niche market access) due mainly to the governance complexity and difficult compliance with multiple jurisdictions.
- *Other positive effects of DAO*: one of the interviewees emphasized the positive effect of DAO on 'profitability'. Also, one of the interviewees mentioned the positive effect of DAO on 'HRD' (i.e. human resource development), while another interviewee pointed to 'data-backed learning'.

Table 4.10
Interview Results on Effects of DAO on Managerial Competencies

Category	Response distribution (N = 9)
Philosophy	Large or very large effect (n = 9) Very small, small, or medium effect (n = 0)
Transparency	Large or very large effect (n = 6) Very small, small, or 'medium effect (n = 3)
Efficiency	Large or very large effect (n = 2) Very small, small, or medium effect (n = 7)
Fairness	Large or very large effect (n = 5) Very small, small, or medium effect (n = 4)
Scalability	Large or very large effect (n = 3) Very small, small, or medium effect (n = 6)
Robustness	Large or 'very large' effect (n = 5) Very small, small, or medium effect (n = 4)
Sustainability	Large or very large effect (n = 6) Very small, small, or medium effect (n = 3)
Others	Very large effect on 'profitability' (n = 1) Large effect on 'HRD' (n = 1) Large effect on 'data-backed learning' (n = 1)

Source: Author's own compilation

The in-depth interviews revealed recurring key success factors such as 'visionary founders', followed by 'great purpose of doing the business', 'partnership with DAO experts and supporters, including local government', and 'feasible business and revenue model' (Table 4.11). For early-stage DAO LLCs interviewed, similar to high-growth startups, a founder may need to be a highly motivated entrepreneur with strong initiative, a clear vision or a meaningful business purpose, a feasible business and revenue model with an implementation plan, and other essential elements. Additionally, it may be essential to build intensive networks with DAO experts and supporters, including local government as part of traditional MSME support ecosystems.

Table 4.11
Interview Results on Key Success Factors for DAOs

Category	Response distribution (N = 9)
Visionary founders	(n = 6)
Meaningful purpose of doing the business	(n = 5)
Partnership with DAO experts and supporters, including local government	(n = 4)
Feasible business and revenue model	(n = 3)
Community engagement	(n = 2)
Founders' expertise in Web3 and blockchain technology	(n = 2)
Transparent governance	(n = 1)
Lower operation costs	(n = 1)
Business that fits the DAO form	(n = 1)
Skill development	(n = 1)
Investor confidence	(n = 1)
Long-term strategic plan	(n = 1)

Source: Author's own compilation

The interviews indicated that mid-to-long-term funding according to business growth stage appeared to be the priority issue for the interviewees (n = 6/9). In addition, the follow-up interviews indicated that most of these interviewees faced common operational challenges on:

- *Immature internal DAO management systems*: challenges remained in DAO governance, especially in securing consensus-making, managing information overload, and a lack of centralized leadership. These were obvious, especially in earlier-stage DAO LLCs with smaller communities. According to the risk assessment of Japan DAO Association in April 2024 and February 2025 (Japan DAO Association, 2025a), Case 7 and Case 9 appeared to have the following general concerns: i) issues with treasury management (e.g. The risk of withdrawals remains elevated, as the same individuals manage the bank accounts and the company.); and ii) a concern about the soundness of governance (since there are only a handful of executive members in the early stage of a DAO LLC, there will continue to be concerns about the soundness

of governance until a certain number of non-executive directors take part in.). Also, Case 2 had minor concerns on: i) clarification of the description regarding the voting power of the International NFTs sold: In the description in the Token Rules of the International NFTs, a governance token with a voting power of two votes at the DAO General Assembly, there was an unclear part regarding the voting power, although there was no contradiction with the actual practice; and ii) Transfer of paid dividend record upon secondary distribution of membership interest tokens: The function to transfer the dividend cap limit when the tokens are transferred between users has not yet been implemented and will be resolved by the newly developed tool before the actual distribution is made.

- *Unbalanced groups of stakeholders*: within these Japanese early-stage DAO LLCs, a recurring pattern emerged where core developers keep significant control over key operations. While this concentration of authority ensured operational stability in the initial stage and protected against hostile actions, it contradicted the DAO ethos of decentralized governance. Token-weighted voting mirrored traditional shareholder inequities, especially when early contributors owned most tokens. Several DAO LLCs were founded by web3-savvy entrepreneurs or technology collectives with pre-existing social capital. These founders often deployed smart contracts, set initial token allocations, and determined governance modalities, giving them a strong initial influence. One case of DAO LLC retained control of multisig wallets among only three core members, despite the presence of dozens of active contributors. This led to dissatisfaction among community members who felt excluded from financial decisions. In another case, early investors with large token holdings

shaped governance outcomes disproportionately. These dynamics paralleled traditional shareholder dominance but contradicted the normative goals of decentralized egalitarianism.

- *Dysfunctional incentive systems*: a complex landscape of these DAO LLCs' expectations and motivation structures was seen. Token-based incentive systems presented a complex mix of opportunities and challenges when applied to microenterprises. Token incentives often coexisted—sometimes uneasily—with conventional reward systems. Several DAO LLCs found the real-time fluctuation of token prices disorienting and hesitated to equate token rewards with income security. Uncertainty about token taxes caused stress and emotional problems for these contributors. A developer expressed reluctance to accept tokens because of fear of devaluation. Regulatory uncertainty regarding token classification and taxation deterred adoption.
- *Lack of collective identity*: collective identity was hard to form in these DAO LLCs, while virtual interaction was normal. Several DAO LLCs that did not focus on community-building encountered the risks of divided participation, superficial engagement, and governance apathy. Discord channels often became inactive, proposals lacked discussion, and contributor turnover became high.
- *Unrealized partnerships with traditional MSME support ecosystems*: Most of these DAO LLCs were not able to fully take advantage of partnering with Japan's traditional MSME support ecosystems, although Japan's traditional MSME support ecosystem is multifaceted, fully offering financial, advisory, and infrastructural support (e.g. chambers of commerce, Japan Finance

Corporation [JFC], credit guarantee corporations, municipal economic development offices, and non-profit incubators).

- *Under-utilization of DAO tools:* It was not realistic for early-stage DAO LLCs to use and pay for both all necessary DAO-specific management tools and general management tools (e.g., KPI management sheet, PDCA framework). Additionally, Notion, Discord, and Snapshot were commonly used to manage communities, but the results varied based on how well people were involved and the community was organized.
- *Limited application of DAO tokens*: utilization of DAO tokens, which facilitate functions such as governance and rewards, was subject to limitations imposed by unclear regulations and lesser-known token-issuing platforms.

Furthermore, the results of the follow-up interviews revealed emerging patterns from cross-case analysis:

- *DAO form matters*: microenterprises operating a DAO LLC in parallel or startups as a DAO (rather than transforming into a DAO) had wider integration of community-based funding mechanisms and possibly less reliance on bank loans.
- *Industry-specific differences*: DAO LLCs in digital economies adopted reward-token strategies more effectively than DAO LLCs in traditional business sectors.
- *Size and capital base*: DAO LLCs with higher initial capital demonstrated better loan negotiation power, especially with regional banks.
- *Leadership structure*: hybrid leadership (i.e. core team and community governance) appeared to outperform flat structures in both decision-making efficiency and external trust.

- *Community engagement*: the depth and quality of community engagement—not just the number of community members—appeared to correlate with funding success.
- *Regulatory ambiguity*: despite the legal entity incorporated as an LLC, several DAO LLCs mentioned unclear banking regulations and credit evaluation standards as barriers.

Research question (RQ) 4: how can DAO help microenterprises improve financial access?: Only three interviewees recognized the significant effect of DAO on overall funding and loans, respectively. Under certain conditions, DAO transformation or integration influenced financial access as follows (Table 4.12).

- *Effect of DAO on overall fundraising*: 3 out of 9 interviewees noted a significant effect of DAO on overall fundraising. These three DAOs were involved in an agricultural product recycling platform, the hotel, and the real estate industry, naturally necessitating mid-to-long-term funds for working capital and CAPEX.
- *Drivers of improved financial access*: the nine interviewees frequently selected ‘transparency’, followed by ‘philosophy’, ‘scalability’, and ‘sustainability’ as the major drivers of improved financial access. Among these four responses, the managerial competencies that were significantly influenced by DAOs included ‘Transparency’, ‘Philosophy’, and ‘Sustainability’.
- *Effect of DAO on loans*: 3 out of 9 interviewees recognized a significant effect of DAO on loans. These three interviewees were involved in the hotel, digital transformation (DX), and the real estate industry, naturally necessitating mid-to-long-term working capital and CAPEX loans. They also mentioned the

decline of ‘Debt Ratio’, ‘Ratio of mid-to-long-term (MLT) loans’, and ‘Gearing Ratio’, while reducing debts by token-based community funding and minimizing required working capital.

- *Drivers of enhanced loans*: the nine interviewees frequently pointed to ‘scalability’, ‘robustness’, followed by ‘transparency’ and ‘sustainability’ as major enablers of enhanced loans. For three interviewees who perceived positive impact of DAO on loans, ‘scalability’ was perceived as the common major driver of enhanced loans, while positive changes in scalability were observed in only 3 out of 9 cases. Several interviewees thus faced constraints in negotiating power with the banks and securing mid-to-long-term capital from banks because of the banks’ unfamiliarity with DAO structures.
- *Linkages between managerial competencies greatly influenced by DAO and drivers of improved financial access*: among top three managerial competencies greatly influenced by DAO, i.e. ‘transparency’, ‘sustainability’, and ‘Philosophy’, all of them were perceived as major drivers of improved financial access. However, ‘philosophy’ was perceived as a driver of enhanced loans by only two interviewees, while ‘scalability’ and ‘robustness’ were perceived as the top drivers of enhanced loans for the nine interviewees.
- *Details of bank transactions*: all interviewees were classified as early-stage microenterprises or startups, having operated for about one and a half years or less and without employees. Therefore, similar to ordinary microenterprises, they appeared to have limited experience in banking transactions (Table 4.13).

Table 4.12

Interview Results on Effect of DAO on Financial Access

Category	Response distribution (N = 9)
Effect of DAO on overall funding	Large or very large effect (n = 3) Very small, small, or medium effect (n = 6)
Drivers of improved financial access (selection of 3 key drivers)	Philosophy (n = 5) Transparency (n = 6) Efficiency (n =3) Fairness (n = 1) Scalability (n =5) Robustness (n =2) Sustainability (n = 5)
Effect of DAO on loans	Large or very large effect (n = 3) Very small, small, or medium effect (n = 6)
Drivers of enhanced loans (selection of 3 key drivers)	Philosophy (n = 2) Transparency (n = 5) Efficiency (n =3) Fairness (n = 0) Scalability (n = 6) Robustness (n = 6) Sustainability (n = 5)

Source: Author's own compilation

Table 4.13

Interview Results on the Details of Loans

No.	Debt ratio	Ratio of MLT loans to total assets	Gearing ratio	Type of lender(s)	Negotiating power with the lender(s)	Short-term loans	Interest rates on short-term loan	MLT loans for CAPEX
1	increase	increase	n.a.	regional bank; JFC; DeFi service provider	strengthening	none	–	none
2	decrease	decrease	decrease	regional bank; JFC; crowdfunding; Defi service provider	decrease	none	–	none
3	decrease	decrease	decrease	regional bank; crowdfunding	no change	none	–	none
4	decrease	decrease	decrease	regional bank; crowdfunding	no change	none	–	none
5	decrease	no change	no change	Regional bank; JFC; Shoko Chukin Bank	no change	no change	no change	no change
6	no change	no change	no change	–	weakening	none	–	no change
7	decrease	decrease	decrease	city bank; regional bank; shinkin bank; credit cooperative; JFC; crowdfunding	no change	none	–	none
8	no change	no change	no change	regional bank; online bank	no change	none	–	none
9	no change	no change	no change	regional bank	no change	none	–	none

Note: 'Shinkin bank' is a type of cooperative financial institution in Japan, similar to a credit cooperative, primarily serving MSMEs and local residents.

Source: Author's own compilation

Research question (RQ) 5: what is an alternative financing strategy for microenterprises through DAOs?: besides community-based funding and indirect financing sources such as regional banks and Japan Finance Corporation (JFC), 6 out of 9 interviewees could access non-traditional financiers such as crowdfunding, DeFi service provider, and online bank (Table 4.14).

Table 4.14
Interview Results on Types of Accessible Financial Institution

Category	Response distribution (N = 9)
City bank	(n = 1)
Regional bank	(n = 8)
Shinkin bank	(n = 1)
Credit cooperative	(n = 1)
Japan Finance Corporation (JFC)	(n = 4)
Development Bank of Japan (DBJ)	(n = 0)
Shoko Chikin Bank	(n = 1)
P2P online lender	(n = 0)
Crowdfunding	(n = 3)
DeFi service provider	(n = 2)
Other (online bank)	(n = 1)

Note: 'Shinkin bank' is a type of cooperative financial institution in Japan, similar to a credit cooperative, primarily serving MSMEs and local residents.
Source: Author's own compilation

4.5 Summary

The case study results implied the potential for DAO transformation or integration to improve key managerial competencies (i.e. philosophy, transparency, sustainability) and eventually broaden access to both traditional and alternative financing channels. In practice, however, such advantages were contingent upon various operational factors: the founders' leadership, internal management systems, networking, partnerships, incentive systems, utilization of DAO tools, and other factors. Also, hurdles in the external environment appeared to exist in Japan, especially regarding regulatory endorsement and the lack of DAO understanding among traditional financiers and other MSME supporters.

These key findings form the foundation for the subsequent discussion, where they are examined in light of the theoretical framework, existing literature, and the five research questions (RQs).

CHAPTER V:
DISCUSSION

5.1 Discussion of Results

This chapter interprets the empirical findings presented in the previous chapter in the context of the existing literature on DAO, blockchain, and MSME management and finance theories. The aim is to position the results within the broader academic discourse, identify areas of agreement and divergence, and prepare the ground for outlining this study's contributions and implications in the following chapter.

5.1.1 Economic Interpretation

The empirical findings in the previous chapter demonstrate that the adoption of DAOs into Japanese microenterprises generates both potential opportunities and challenges across governance, operational structures, and financing.

The results of this case study imply that DAO LLCs have the potential to bypass typical financial issues of microenterprises by using token-based crowdfunding (i.e. 'direct finance') and community-based trust formed by improving philosophy, transparency, and sustainability. In practical terms, the evolution of DAO-based recording and reporting systems may serve as a backup for transparent governance. Besides the token-based crowdfunding, thanks to such a transparent governance and trustworthiness, potentially DAO integration has a positive impact on banking transactions, i.e. 'indirect finance'.

From an economic perspective, the presence of blockchain-enabled financing channels reduces both transaction and agency costs, offering a structural economic advantage over traditional MSMEs. Therefore, blockchain-backed DAO LLCs may reduce the costs by automating trust and facilitating P2P interactions, aligning with

Williamson's theory of transaction cost economics (Williamson, 1985). In SME finance theory, DAO LLCs have the potential to solve the inherent problems in SME finance, i.e. 'information asymmetry' and 'relatively high transaction costs' for SME lenders (Yabushita and Bushimata, 2002). However, as the case study implied, for early-stage DAO LLCs, the added complexity of governance literacy and DAO operational challenges may require DAO management experience and onboarding costs that might partially offset these advantages of adopting DAOs.

5.1.2 Consistency and Discrepancy with the Literature Review

Following the economic interpretation of the study results, to assess the relationship between the existing body of knowledge and the empirical findings, it is important to examine both areas of convergence and divergence.

Table 5.1 provides a structured comparison between the key insights identified in the literature review and the evidence obtained from the case study interviews. This comparison reveals whether the empirical findings 'supported' established theoretical assumptions, 'contradicted' them by suggesting alternative dynamics, or 'extended' the debate by introducing additional perspectives not previously captured in the literature. Such a framework allows for a nuanced evaluation of how DAO-integrated microenterprise initiatives interact with established theories of business management and finance for MSMEs.

In the first place, through the reasoning process illustrated in Figure 2.6, the literature review offered a testable hypothesis for a Japanese case study: DAO may help microenterprises improve financial access. To validate the hypothesis, the case study focuses on the linkages between DAO adoption, microenterprise management, and financial access for microenterprises. However, contrary to the hypothesis, the results of

the case study did not clearly prove the linkages to get better financial access for DAO-integrated microenterprises in Japan.

Indeed, the case study results indicate that several findings were consistent with prior literature. The blockchain-enabled DAO governance improved microenterprises' managerial competencies in such fields primarily as philosophy, transparency, and sustainability within the nine Japanese DAO LLCs. The results of the case study also implied that these three types of competencies overlapped in the case study results and the literature appeared to be an advantage for microenterprises efficiently proving their 'reliability' and 'trustworthiness'. Also, microenterprises in a form of blockchain-backed DAO LLC took various external funding options, including 'direct finance' (e.g. token-based community funding), and 'indirect finance' (e.g. bank loans), as well as non-traditional financial services such as crowdfunding, DeFi service provider, and online bank. This finding partially supports the literature review. (Table 5.1)

However, notable discrepancies are observed. The results revealed that only 3 out of 9 interviewees perceived significant effects on overall fundraising and loans, respectively. These three interviewees are involved in an agricultural product recycling platform, DX, the hotel, or the real estate industry, naturally necessitating mid-to-long-term funds for working capital and CAPEX. This may be interpreted as a result from several factors in these nine cases: i) all the Japanese cases are classified as early-stage DAO LLCs so that they had not fully taken advantage of DAO-driven competencies such as 'scalability' and 'robustness' enhanced by the borderless and diversity nature of DAOs; ii) they naturally face financial difficulty due to the short business history of less than three years, similar to ordinary microenterprises in Japan; and iii) they face remaining legal and operational challenges within Japanese DAO LLCs. (Table 5.1)

In brief, the comparative analysis highlights that the findings both validate and challenge existing scholarly assumptions. The areas of consistency reinforce the applicability of established theories to DAO-based management, while the discrepancies underline the impact of DAO on financial access for microenterprises. Granted that the Japanese case study results did not clearly prove the impact of DAO on microenterprise financial access, there is still considerable validity in the potential impact of DAO integration on diversified financing options for microenterprises, including token-based crowdfunding, non-traditional financial services, and the banks. These findings demonstrate the value of combining literature review and empirical investigation to advance theoretical and practical understanding. (Table 5.1)

Having clarified the areas of convergence and divergence between the case study evidence and the existing literature, the next subsection turns to the direction of practical implications of these findings.

Table 5.1
Alignment between Literature Review and Case Study Findings

<table>
<tr><td colspan="6">Impact of DAO on:</td><td colspan="2" rowspan="2">An alternative financing strategy for microenterprises (RQ5)</td></tr>
<tr><td colspan="2" rowspan="2">Microenterprise management (RQ2)</td><td colspan="4">Financial access for microenterprises (RQ4)</td></tr>
<tr><td colspan="2">Overall funding</td><td colspan="2">Loans</td></tr>
<tr><td>Literature</td><td>Case study</td><td>Literature</td><td>Case study</td><td>–</td><td>Case study</td><td>Literature</td><td>Case study</td></tr>
<tr><td>DAOs have the impact on ‘business’ management</td><td>–</td><td rowspan="8">Blockchain technology has a positive impact on ‘SME’ finance (e.g. transparent record-keeping, smart contracts)</td><td>Contradicted (n = 3/9)</td><td rowspan="8">–</td><td>Contradicted (n = 3/9)</td><td rowspan="8">MSMEs with a DAO may diversify external funding options, including ‘direct finance’ and ‘indirect finance’.</td><td rowspan="8">Partially supported
----
Access with non-traditional financiers (n = 6/9)</td></tr>
<tr><td>Philosophy</td><td>Supported (n = 9/9)</td><td><u>Major drivers</u>
Partially supported

Transparency (n = 6/9)
Philosophy (n = 5/9)
Sustainability (n = 5/9)
Scalability (n = 5/9)</td><td><u>Major drivers</u>
Partially supported

Scalability (n = 6/9)
Robustness (n = 6/9)
Transparency (n = 5/9)
Sustainability (n = 5/9)</td></tr>
<tr><td>Transparency</td><td>Supported (n = 6/9)</td></tr>
<tr><td>Efficiency</td><td>Contradicted (n = 2/9)</td></tr>
<tr><td>Fairness</td><td>Supported (n = 5/9)</td></tr>
<tr><td>Scalability</td><td>Contradicted (n = 3/9)</td></tr>
<tr><td>Robustness</td><td>Supported (n = 5/9)</td></tr>
<tr><td>Sustainability</td><td>Supported (n = 6/9)</td></tr>
<tr><td colspan="2">Factors not noted in literature:</td><td colspan="2">Key success factors (RQ2, RQ4) Case study</td><td colspan="3">DAO management challenges (RQ2, RQ4) Case study</td></tr>
<tr><td>Profitability</td><td>Extended (n = 1/9)</td><td colspan="2" rowspan="3">- Visionary founders
- Meaningful business purpose
- Partnership with DAO experts and supporters, including local government
- Feasible business and revenue model</td><td colspan="3" rowspan="3">- Immature internal management systems
- Unbalanced groups of stakeholders
- Dysfunctional incentive systems
- Lack of collective identity
- Unrealized partnerships with traditional MSME support ecosystems
- Under-utilization of the DAO tools
- Limited application of DAO tokens</td></tr>
<tr><td>HRD</td><td>Extended (n = 1/9)</td></tr>
<tr><td>Data-backed learning</td><td>Extended (n = 1/9)</td></tr>
<tr><td colspan="8">Case study findings on the nine DAO LLCs in Japan: i) early-stage businesses; ii) financial difficulty due to the short-term business history of less than about one and a half years; and iii) remaining legal and operational challenges in Japan.</td></tr>
<tr><td colspan="2">Definitions and nature of DAO (RQ1)</td><td colspan="6">Banking method for assessing MSME credit risk (RQ3)</td></tr>
<tr><td>Literature</td><td>The nature of DAOs is reflected by blockchain-enabled features in governance.</td><td>Literature</td><td colspan="5">Banks still need to take a lot of time to collect and access MSMEs’ ‘non-financial information’ regarding ‘reliability’ and ‘trustworthiness’.</td></tr>
</table>

Note: ‘Supported’ indicates consistency with the literature, ‘Contradicted’ indicates divergence, and ‘Extended’ indicates additional findings not covered in the literature.
Source: Author’s own compilation

5.1.3 Direction of Practical Implications

While this study contributes to the literature on the impact of DAO on microenterprise financial access, it provides practical implications for microenterprise owners/entrepreneurs, startup/MSME-focused banks/financial institutions, and startup/MSME policymakers. The Japanese DAO LLC cases highlight not only domestic

regulatory innovation but also broader implications for any countries exploring new mechanisms of MSME financing. In particular, the institutionalization of DAO LLCs in Japan shows how DAOs incorporated as 'limited liability companies' may transform blockchain-based communities into vehicles for microenterprise financial support, with international relevance, particularly for emerging economies facing severe MSME financing gaps.

First, DAO-integrated microenterprise owners/entrepreneurs may diversify funding options, build trust with transparent governance, and improve the decision-making process. Although DAO adoption requires investment in governance training and compliance with regulatory mandates, it may create new pathways for diversification, with a focus on areas that are not adequately served by mainstream financial systems. To ensure sufficient, sustainable funding and maximize free cash flows (FCFs) from a mid-to-long-term perspective, a hybrid financing strategy adopting a DAO may be an alternative strategic option for ordinary microenterprises.

Second, startup/MSME-focused banks/financial institutions have a significant obstacle to the wider acceptance of DAO-integrated microenterprises. They often encounter difficulties, including uncertain legal frameworks (e.g., KYC) and a lack of standard credit assessment methods. The term 'DAO-to-Bank Bridging' pertains to the establishment of structures and methodologies designed to improve the interaction between DAOs and financial institutions. The utilization of DAOs as a framework to significantly enhance the credit risk evaluation and surveillance of microenterprise clients is recommended. Banks/financial institutions may get transparent data by redesigning the MSME credit assessment model for DAOs and integrating it with DAO-based MSME business operations, thus naturally solving information asymmetry and collateral shortage issues.

Finally, policymakers should consider: i) providing legal clarity to facilitate DAO adoption while minimizing operational risks; and ii) recognizing DAOs as alternative financial intermediaries that may complement existing MSME financial ecosystems. These actions may encourage MSME innovation and resilience. A proactive strategy is recommended for government agencies in charge of MSME development to use DAOs to boost MSME transparency, efficiency, and financial inclusion. Governments may strengthen the MSME financial ecosystem and digital innovation through updated regulations, proactive financial institution oversight, and specific policy-based loan programs for DAO-structured MSMEs, particularly microenterprises.

5.1.4 Limitations of the Research

Despite the contributions of this study, several limitations should be acknowledged. First, the empirical evidence is based on a limited number of case studies (N = 9), which may not capture the full diversity of DAO-based initiatives in Japan or globally. The relatively small sample size constrains the generalizability of the findings, even though it allows for in-depth qualitative insights.

Second, the study focuses exclusively on DAO LLCs operating in Japan, a context shaped by specific regulatory frameworks and cultural factors. As a result, the conclusions may not be directly transferable to DAO practices in other jurisdictions with different legal or institutional environments.

Third, the reliance on self-reported data from interviews introduces potential biases, such as selective memory, self-presentation, or the influence of the researcher's interpretation during transcription and coding. Although triangulation with documentary sources was undertaken, the qualitative nature of the data still leaves room for subjectivity.

Finally, the study examines DAO applications within a particular time frame. Given the fast-paced evolution of blockchain technologies, DAO governance mechanisms, and regulatory responses, some of the findings may become outdated as the ecosystem matures.

Future research could expand the sample size, adopt comparative international perspectives, and incorporate longitudinal data to assess how DAO-based financing evolves over time. In particular, the case study that combines quantitative performance metrics with qualitative assessments of governance and community engagement would provide a more comprehensive understanding of DAO impacts on microenterprise management and financing.

5.2 Discussion of Each Research Question

Of the formulated five research questions (RQs) RQ2, RQ4, and RQ5 are directly addressed through the case study analysis, while RQ1 and RQ3 serve primarily as background and contextual considerations. This section therefore focuses on discussing the findings in relation to RQ2, RQ4, and RQ5, thereby linking the empirical evidence with the research objectives. Each research question is considered in turn, beginning with RQ2 on the impact of DAO on microenterprise management.

5.2.1 How does DAO affect microenterprise management? (RQ2)

The results of the case study demonstrate that DAO adoption transforms management practices and long-term value creation primarily by improving philosophy, transparency, and sustainability for the nine Japanese DAO LLCs. This partially supports the literature from Hashemi-Khiabani and Polónia (2023), Pawlowski (2024), and Strnad (2024).

However, one of the primary challenges faced by them is legal uncertainty in Japan. This reflects the findings from Boss (2023), Digital Agency of Japan (2023), Japan DAO Association (2025a), Lustenberger et al. (2025), Riva (2019), and Wang (2025). The need for multi-jurisdictional compliance also represents a regulatory challenge that previous studies have not covered (Atzori, 2015).

At the same time, operational issues emerge within the Japanese DAO LLCs, including immature internal DAO management systems; unbalanced groups of stakeholders; dysfunctional incentive systems; and lack of collective identity. This observation is reflected mostly in the literature from Han et al. (2025), Li et al. (2023), Lustenberger et al. (2025), Pawlowski (2024), Santana and Mikalef (2024), Strnad (2024), and Wang (2025).

In addition, the observed under-utilization of DAO tools and the limited application of DAO tokens reflect the current context in Japan, where the legal stability of token-related regulations has yet to be fully established and the supporting infrastructure for DAO management tools remains in its early stages of development. Also, the limited and often inaccurate understanding of DAOs has seemed to constrain the formation of partnerships with traditional MSME support ecosystems in Japan.

In order to structure these seven identified challenges, a two-dimensional classification framework can be applied. The first dimension distinguishes whether a challenge originates from the external environment or from the internal environment. The second dimension differentiates whether the challenge is DAO-specific—that is, unique to decentralized organizational forms—or whether it represents a general challenge commonly faced by MSMEs regardless of their organizational model. By mapping the seven challenges across these two axes, a clearer understanding of their nature, scope, and implications can be achieved, as illustrated in Figure 5.1 below.

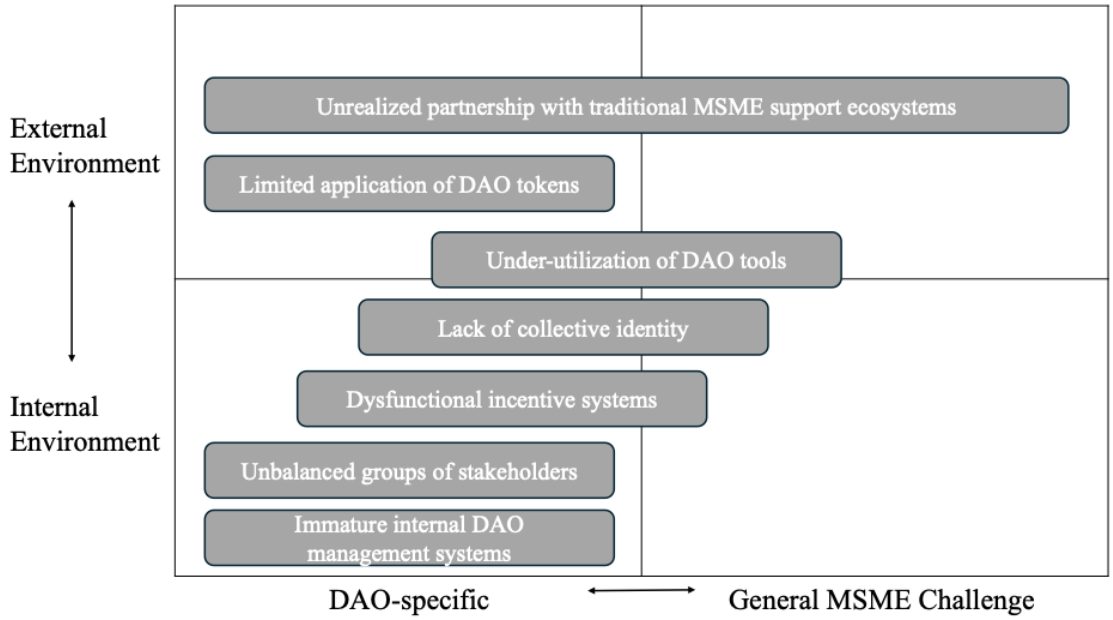


Figure 5.1
Common Management Challenges for the Japanese DAO LLCs
Source: Author's own compilation

The following five challenges faced by the Japanese DAO LLCs have seemed to prompt a significant discussion, leading to the key controversies as detailed below.

(1) Immature internal DAO management systems:

One of the operational challenges for DAO LLCs is the complexity of DAO-based voting mechanisms. They occasionally slow decision-making, echoing the 'governance overload' identified by Zetzsche et al. (2020). However, success is influenced by supportive leadership, clear rules for decision-making, and well-defined token systems. Some DAO LLCs adopt a modular governance structure, separating operational and strategic decisions, thus reducing decision fatigue and improving agility. Others introduce token-weighted voting thresholds to prevent domination by early investors. These adaptive measures demonstrate the flexibility of the DAO LLC model when tackling various organizational challenges.

The case study findings imply that while DAO LLCs foster inclusivity, they may reduce efficiency if governance mechanisms are not carefully adapted to cultural contexts. In the Japanese context, Japanese cultural preferences for harmony and consensus amplify these difficulties, as business managers hesitate to act decisively without unanimous agreement.

The findings also resonate with the Ostrom's (1992) framework on collective governance, showing that self-regulating communities may establish sustainable rules and enforcement systems. However, in contrast to the Ostrom's community-based settings, DAOs may introduce programmable governance where rules are enforced algorithmically.

On the other hand, the Japan DAO Association is currently developing the guidelines and template of Articles of Incorporation necessary for newly establishing DAO LLCs in Japan, while referring to the coala's *Model Law for DAOs* (2021).

In addition, the association has conducted risk reviews for DAO LLCs in Japan. The negative checklist regarding DAO LLC management includes: i) confirmation of Articles of Incorporation: check for differences from the template Articles of Incorporation; ii) confirmation of treasury management: Appropriate measures for treasury fund outflow; iii) compliance with rules for DAO LLCs: confirmation of design of revenue distribution, confirmation of authority of non-executive members, and confirmation of decision-making authority over tokenholders; and iv) other checks for illegal activities and violation of public order and morals. In addition, the negative checklist regarding DAO LLC's tools include the following items: i) when dealing with smart contracts, the contract must be verified; ii) when selling membership interest tokens (NFTs), the tool must be established so that it cannot be purchased by an unspecified number of people from the tool provider/operator's website, and the DAO

itself must provide a direct link from its website or embed the link in its website or application. The DAO operator's website should have the functionality for selling NFTs; iii) when issuing paid tokens, there must be a function to stop sales at one million tokens. Alternatively, it is required to guarantee pricing of at least JPY 1,000 per token; and vi) paid tokens must be issued on-chain. (Japan DAO Association, 2025b)

At present, the association has found common operational risks within new Japanese DAO LLCs, as presented in Table 5.2 (Japan DAO Association, 2025b).

Table 5.2
Typical Operational Risks within Japanese DAO LLCs

	Issues	Risk	Countermeasures
Centralized treasury management	- When checking the rules for treasury management, such as operational rules, it is observed that the initial three executive employees are the fixed signers of the multi-signature wallet, that treasury management is performed using a single signature wallet, and that there are no rules for treasury management.	- Misuse of funds (i.e. use or absconding of funds that do not conform to the DAO's resolution, due to monopoly of treasury management by a specific member) - Outflow of funds (i.e. the risk that treasury funds may be extracted by a third party if a single private key is used or the management method is not clearly defined in the first place)	- Adopt a multisig wallet. - Allow multisig signers to be appointed and dismissed by DAO vote. - Clearly state the management method.
Excess of dividend cap	- No mechanism in place to ensure that dividends do not exceed the amount invested. - No way to calculate/record the monetary value of non-monetary dividends - Unclear how to track dividends when membership interest tokens are transferred.	- Under the current DAO LLCs (the April 2024 amendment to the Cabinet Office Ordinance), dividends are allowed up to the amount of capital contribution (except for operating partners). If the dividend limit is exceeded, it will be illegal. The dividend limit will be inherited even if the tokens are transferred.	- Introduce a mechanism to limit dividends (smart contracts and regulations). - Clarify how to record monetary values. - Develop white papers and regulations.
Confusion between compensation for labor and dividends	- The same tokens are used for contributions and as dividends, and there is no way to distinguish and record them.	- The dividend cap does not apply to tokens distributed as compensation for labor (i.e. compensation for contribution activities, etc. at DAO). This means that compensation can be paid to members who actively engage in activities regardless of the dividend cap, but if the distinction from dividends is not clearly defined, there is a risk of being suspected of violating the dividend cap.	- Separate tokens for dividends and tokens for labor compensation. - Provide a means to record each distribution of dividends and labor compensation.
Understanding of DAO protocols for executive directors	- Executive Director's explanation of the protocol differs from that described in the regulations. - Executive Director is unable to explain the protocol.	- A DAO LLC operates with a combination of execution by smart contract and genus execution based on the articles of incorporation and regulations. If the executing members do not understand the protocols, voting results, etc., may not be executed in accordance with the protocols.	- Study sessions on protocols by operating employees - Creation of highly readable proprietary manuals - Plain text protocols in white papers

Source: Adapted from Japan DAO Association (2025b, pp. 16–19), translated and modified by the author

(2) Unbalanced groups of stakeholders:

DAO LLCs need to bring together a variety of people, creating a complex system with different goals, skills, and levels of power. These typically include core founders, token holders, contributors (i.e. developers, designers, marketers), early investors, advisors, external service providers (e.g. lawyers, accountants), and community members.

A typology-based analysis may fix stakeholder imbalance. For example, stakeholders may be grouped as: i) capital providers (e.g. token purchasers); ii) operational contributors; iii) strategic advisors; and iv) governance participants. Each group may be allocated distinct voting rights or governance functions. Role-based voting, time-weighted participation metrics, and capped token influence are emerging mechanisms to balance power.

Mechanisms such as governance councils or randomly selected juries may redistribute influence more equitably. However, these groups' power dynamics are often unequal and shifting, influenced by governance designs and how tokens are distributed. Their roles are not static, and develop according to governance structures, token economics, and engagement levels. DAO LLCs might become unfair or stop working if they do not know this, preventing them from helping microenterprises.

To build strong and fair DAO LLCs, it is important for DAO designers to understand how different people involved have power and how they see themselves. DAO designers need to use role-weighted voting, token vesting, or governance councils for representation. Power mapping tools and stakeholder audits may also be conducted repeatedly to identify concentration risks.

Power dynamics are not inherently negative—they may ensure coherence and security—but unchecked asymmetries threaten legitimacy. DAO LLCs could become more resilient and trustworthy through stakeholder-aware governance.

(3) Dysfunctional incentive system:

Token design is a fundamental element in the operational and governance architecture of DAO LLCs. In decentralized ecosystems, tokens function not only as mediums of exchange but also as mechanisms to incentivize contribution, signal reputation, and align stakeholder interests.

However, the bias that tokens universally motivate requires careful consideration. The theoretical promise of tokens lies in their programmable, transparent, and composable nature. Tokens are typically issued to reward contribution, encourage voting, and provide voting power. DAO LLCs must distinguish between different types of tokens such as utility tokens, governance tokens, and reputation or soulbound tokens (SBTs). Utility tokens provide access to services or content. Governance tokens grant voting rights and may confer influence over strategic decisions. SBTs, which are non-transferable and often earned through verified contributions, signal trust and reputation within the community. DAO LLCs may adopt combinations of these tokens to foster balanced and sustainable ecosystems.

Incentive theory generally posits that individuals are motivated by both extrinsic and intrinsic factors. A well-designed token model should account for both. For instance, extrinsic incentives such as token rewards may encourage participation in such tasks as code audits, marketing, or event planning. However, excessive reliance on financial rewards may crowd out intrinsic motivation—such as the desire to contribute to a meaningful project or gain peer recognition. Hybrid incentive systems that reward

contribution with both fungible tokens and non-fungible badges or roles appear to prove more effective.

One model that has gained traction is the use of ‘contribution scoring’, where community members earn points based on verified activity, which may later be converted into tokens or governance rights. Several Japanese DAO LLCs have experimented with this model by incorporating traditional business values such as reliability, long-termism, and group harmony.

Token vesting schedules and lock-up periods may promote long-term alignment and reduce speculative behavior. This is particularly relevant in Japan, where organizational loyalty, gradual value creation, and spontaneous playfulness seem to be culturally reinforced. Token mechanisms that reward continued engagement over time may resonate with many Japanese DAO participants.

Transparency and fairness in token distribution are critical. Token allocation should be clearly documented and auditable, preferably through smart contracts. DAOs must avoid plutocratic structures where early investors or core developers disproportionately influence governance. Quadratic voting and conviction voting mechanisms may help mitigate these risks by weighting votes based on conviction or spreading influence more equitably. Nevertheless, high volatility in token value may create uncertainty and anxiety for contributors.

A general theory of behavioral economics suggests that incentives are most effective when considering people’s risk tolerance, culture, and mental shortcuts. DAO designers must go beyond tokenomics and adopt pluralistic incentive architectures that align with participant heterogeneity theories. Intrinsic motivators such as autonomy, purpose, and social connection are as vital as extrinsic rewards. Overreliance on financial tokens might diminish intrinsic engagement, leading to ‘crowding out’ effects.

In short, a DAO's success may hinge on its participants' valuation, security, and alignment, not only on payment. Moreover, incentive preferences are shaped by culture, risk aversion, and experience. Japanese microenterprises with integrated DAOs appear to prioritize stability and trust, not speculative gains. Token systems need to be incorporated within incentive architectures that culturally resonate.

(4) Lack of collective identity:

One often-overlooked aspect of DAO LLC management is the formation of collective identity—the shared sense of belonging and purpose among members. Token economies should be regarded as enhancements rather than replacements for established incentive structures. The goal is to present multifaceted, substantial, and context-dependent motivators that are consistent with both the organization's aims and personal wellness.

However, the formulation of collective identity is a challenge for DAO LLCs. In the Japanese context, some DAO LLC founders try to schedule weekly town halls, publish governance newsletters, or maintain contributor leaderboards. A successful case uses onboarding rituals such as 'contributor pledge signing' and hosts offline community-building events in rural Japan. These rituals allow community members to align around a shared mission. Nevertheless, inconsistent participation, platform fragmentation (e.g. Discord, Telegram, Snapshot), and cultural misalignments sometimes lead to identity diffusion.

Design strategies for collective identity formation may include: i) reputation systems: non-financial tokens reflecting community standing; ii) stable reward mechanisms: use of stablecoins or inflation-resistant tokens; iii) gamified milestones:

unlocking incentives through collective achievements; and iv) flexible opt-in models: allowing participants to choose their compensation mix.

Ultimately, collective identity is not a luxury—it is an organizing principle. Without it, DAO governance would need to risk devolving into transactionalism. With it, DAOs could sustain deeper cooperation, resilience under stress, and long-term mission coherence. As DAO LLCs become more complex, the ability to cultivate and maintain a strong collective identity may determine their long-term sustainability.

(5) Unrealized partnership with traditional MSME support ecosystems:

In Japan, DAOs are often positioned as disruptive innovations. Also, it is widely misunderstood that integrating DAO structures into the microenterprise landscape is an opposing force to existing business organizations.

However, DAO LLCs demonstrate the potential to function as complementary innovations that enhance the market reach, accountability, and adaptability of traditional MSME support ecosystems. For example, DAO LLCs may manage local crowdfunding and community engagement, while a chamber of commerce may offer regulatory support and access to training programs. DAO LLCs may offer programmable trust, collective action tools, and financial flexibility through tokenization and smart contracts.

From an institutional economics perspective, this synergy may be understood through the lens of 'institutional complementarity'—where the functionality of one organization enhances the effectiveness of another. A DAO's flexible, transparent, and participatory architecture may reinforce the credibility and reach of public agencies, while the latter may provide legal, financial, and infrastructural stability.

The effectiveness of DAO LLC models may eventually depend on digital literacy, platform usability, and clear governance protocols. For example, the case study results

affirm the so-called Buterin's notion of decentralized adaptability (2014), where token-based voting enables rapid strategic shifts. Yet, this contrasts with the Storey's assertion that owner-led centralized decision-making remains the most agile form for MSMEs (Storey, 1994). This divergence is due to the digital-native nature of DAO-integrated microenterprises, which benefit from widely distributed decision-making without the geographic constraints faced by traditional MSMEs.

To operationalize complementarity, public agencies should establish DAO liaison offices, publish DAO-compatible funding guidelines, and promote experimental zones where hybrid governance models can be tested. DAO LLCs, in turn, must standardize reporting, build local networks, and engage proactively with stakeholders.

5.2.2 How can DAO help microenterprises improve financial access? (RQ4)

The case study evidence did not show clearly that DAO may help microenterprises improve financial access. However, there is still considerable validity in the assumption for the following reasoning process: i) the positive impact of 'blockchain technology' on SME financial access is observed in the existing literature (Chen, 2023; Cui and Bulis, 2023; Kumar et al., 2023); ii) the nature of DAOs is reflected by blockchain-enabled features in governance (Rikken et al., 2023; Santana and Albareda, 2022; UK Law Commission, 2024) so that DAO LLCs may take advantage of a blockchain-enabled governance structure and financing backed by DLT and smart contracts; and iii) top three management elements improved by DAO adoption in the case study, i.e. philosophy, transparency, and sustainability, appear to be advantageous for microenterprises efficiently proving their 'reliability' and 'trustworthiness' mentioned in the literature (Beltrame et al., 2023; Berger and Frame, 2005; Galassi and Newton, 2001; Nemoto, 2022; Yoshino, 2011) to lenders and investors.

However, although ‘transparency’, ‘sustainability’, and ‘Philosophy’ are top three managerial competencies positively influenced by DAO, ‘philosophy’ is perceived as a driver of enhanced loans by only two interviewees, while ‘scalability’ and ‘robustness’ are recognized as the top two drivers of enhanced loans. This result implies that there is a hurdle in accessing bank loans for the Japanese early-stage DAO LLCs, because ‘scalability’ and ‘robustness’, which are recognized as necessary to enhance bank loans, have not significantly improved with the adoption of DAOs.

In short, despite difficulties with blockchain application and MSME bank loans, DAO LLCs using blockchain give new options for financing outside of the conventional banking.

- Several cases show that microenterprises gain access to both domestic and international investors through token issuance and DeFi services. According to an interviewee, “I was unable to get a loan from a bank before, but the DAO helped me find funding from investors both locally and internationally.” This case follows Catalini and Gans (2020), who argue that blockchain reduces capital costs by mitigating information asymmetry.
- The case study finding that DAO-integrated microenterprises enjoy broader funding access resonates with Atzori (2015), who argues that DAOs may reduce reliance on traditional financial intermediaries.
- By enabling access to blockchain-based capital, DAOs may overcome credit constraints that negatively affect MSMEs. The broader funding access of DAOs reduces transaction costs and dependency on intermediaries, aligning with theories of disintermediation in finance (Zetzsche et al., 2020).
- In contrast with the framework of Berger and Udell (2004), which emphasizes lending technologies and infrastructure, DAO-enabled finance relies on

programmable trust and collective reputation. For Japanese microenterprises, frequently limited by insufficient collateral, this constitutes an innovative approach to securing external financing.

- The DAO adoption for financing remains uneven. One of the interviewees emphasizes, “Because the DAO-related regulations are unclear, investors and lenders were cautious, and the fundraising took longer”. This implies regulatory uncertainty and crypto-asset volatility as barriers to the sustainability of DAO management. Additionally, traditional banks often lack DAO-specific credit evaluation frameworks. Further institutional acceptance may be needed through regulator engagement and establishment of DAO credit ratings.

The key contribution of this study is the demonstration that DAO LLCs substitute partially for traditional intermediaries, offering viable alternatives to MSME financing where credit constraints exist.

5.2.3 What is an alternative financing strategy for microenterprises through DAOs? (RQ5)

The case study evidence proves the potential for DAO LLCs to diversify external funding options, including ‘direct finance’ (e.g. token-based community funding), and ‘indirect finance’ (e.g. bank loans), as well as non-traditional financial services such as crowdfunding, DeFi service provider, and online bank. Therefore, although the development of blockchain technology is still immature and faces legal and operational challenges, this study could offer a scalable and sustainable financing model for microenterprises through DAOs.

In contrast with ordinary microenterprises, microenterprises in the form of a DAO LLC can obtain a new path of external 'direct financing' from individual/Web3 investors (e.g. customers, fans, Web3-focused angel investors, stakeholders) and ventureDAOs. This reflects the literature from Bjellerås (2023), and Karakostas and Pantelidis (2024).

Besides token-based crowdfunding, 6 out of 9 interviewees can access non-traditional financiers such as crowdfunding, DeFi service providers, and online banks. This reflects the exploration in the literature from Jiang et al. (2023), Pechlivanidis (2022), and Zichichi et al. (2019).

The observed funding diversification in DAO-integrated microenterprises supports existing findings on the disintermediation potential of blockchain (Zetzsche et al., 2020). However, in contrast to prior studies focusing on high-growth startups, this study demonstrates applicability within ordinary microenterprises, part of the MSME sector with distinct financing constraints (Berger and Udell, 2004).

The inclusion of DeFi lending channels suggests a departure from reliance on formal credit scoring, contrasting with traditional SME financing models (Berger and Udell, 2004). Access to DeFi extends the work of Rauchs et al. (2018) on crypto-asset ecosystems, showing that integration into decentralized finance networks can directly enhance financing sustainability.

The observed importance of legal clarity is in line with Zetzsche et al. (2020), who stress that regulatory uncertainty is a key barrier to blockchain adoption. Such challenges as regulatory uncertainty are consistent with Catalini and Gans (2020), who highlight the trade-off between openness and control in blockchain systems. Also, the importance of understanding how DAOs are governed is similar to what Wright and De Filippi (2015) discussed how blockchain-backed organizations learn. While these challenges are not unique to DAO-integrated MSMEs, their impact may be magnified in

microenterprises where resource constraints limit the ability to absorb shocks or invest in governance training.

Eventually, the emerging DAO-enabled financing strategy can form a hybrid model—complementing traditional financing approaches with blockchain-enabled governance and community-based funding (Bjellerås, 2023; Karakostas and Pantelidis, 2024). This alternative financing strategy not only provides new financing channels but also redefines organizational structures and market participation. The economic interpretation thus extends beyond finance into institutional change, underscoring the disruptive potential of DAOs for microenterprise development. This study proposes an alternative financing strategy structured around three pillars shown in Table 5.3 below.

Table 5.3
Proposed DAO-based Financing Strategies

Pillar	Mechanism	Benefits	Risks
Tokenized membership and contribution rights–aligning incentives across governance and finance	Stakeholder token	Incentive alignment	Dilution of control
Hybrid financing channels–combining community-based token investment with selective engagement with banks or credit unions	DAO-based community funding and banks	Risk diversification and Sustainable financing	Regulatory uncertainty
Adaptive governance mechanisms–balancing transparency and efficiency while adapting to cultural norms	Tiered voting rights	Faster decisions	Potential exclusion

Source: Author's own compilation

This strategy not only enhances financial resilience but also broadens the scope of stakeholder engagement. It represents a shift from firm-centric to community-centric financing, consistent with Ostrom's principles of collective action but adapted to the digital economy. The academic contribution of RQ5 lies in theorizing DAO-based financing as an alternative institutional arrangement for ordinary microenterprises.

In summary, the discussion has demonstrated how the Japanese DAO case studies both confirm and challenge existing theoretical assumptions. Even with such constraints

as a small sample, a limited focus on Japanese DAO LLCs, self-reported bias without financial statements of DAO LLCs interviewed, this study makes contributions on three levels:

(1) *Theoretical Contribution*: this study provides a significant academic contribution by addressing the research gap in the intersection of DAO integration and microenterprise financial access. It also extends the literature on MSME finance by demonstrating that DAO integration structures may serve as a primary driver of funding diversification, challenging the traditional emphasis on policy-driven or institutional reforms.

(2) *Empirical Contribution*: this study provides comparative evidence between DAO-integrated and traditional MSMEs in the Japanese context, a geography and market structure underrepresented in existing DAO research. It provides Japan-specific evidence on DAO applications in MSMEs, filling a geographic research gap. It also aims to expand the understanding of DAO management among microenterprises worldwide, while offering insights into novel governance structures for microenterprises.

(3) *Methodological Contribution*: this study employs a case study methodology, combining qualitative in-depth interviews and document analysis, to capture nuanced governance and funding dynamics within microenterprises.

Building on these insights in this chapter, the following chapter concludes this study by synthesizing the key findings, identifying the study's contributions to literature and practice, and outlining implications for all the MSME stakeholders. It also reflects on the research's limitations and suggests directions for future research.

CHAPTER VI:

SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

6.1 Summary of the Research

This study has investigated five research questions (RQs), focusing on DAO transformation or integration within microenterprise management and financing. The following is a summary of the key findings from Chapters IV and V:

- *Impact of DAO on microenterprise management*: DAO transformation or integration enhances management philosophy, transparency, and sustainability. This may positively influence microenterprise financial accessibility through building community-based trust with stakeholders.
- *Diversified financial channels*: if DAOs are adopted, microenterprises can gain better financial access through opening new funding paths such as token-based crowdfunding, DeFi services, and community-based lending, while increasing 'reliability' and 'creditworthiness' with financiers.
- *An alternative financing strategy for microenterprises through DAOs*: a hybrid model of alternative financing emerges as a practical funding strategy, combining DAO-based community capital with institutional loans and strategic partnerships. This approach is beneficial, especially for microenterprises seeking to scale sustainably from a mid-to-long term perspective.
- *Key factors to DAO success*: Key success factors mainly include visionary founders; meaningful business purpose; partnership with DAO experts and supporters, including local government; and a feasible business and revenue model.

- *Challenges for DAO management and financing*: Major barriers include immature internal management system; unbalanced group of stakeholders; dysfunctional incentive systems; lack of collective identity; unrealized partnerships with traditional MSME support ecosystems; under-utilization of the DAO tools; and limited application of tokens in the legal uncertainty.
- *New patterns of DAO LLCs*: This study highlights new patterns in DAO LLCs, such as flexible governance and DAO-specific ways of managing a business, which positively affect microenterprise financial access and trust building.

6.2 Implications

6.2.1 Theoretical Implications

This study provides a significant academic contribution by addressing the research gap at the intersection of DAO integration and microenterprise financial access. This extends 'MSME finance' literature by showing that DAO structures may serve as a primary driver of financing diversification for microenterprises, while challenging traditional emphasis on policy-driven or institutional reforms as well as the key issues of MSME finance, i.e. information asymmetry and relatively high transaction costs for MSME lenders. In terms of methodology, this study contributes by employing case study methodology, combining qualitative in-depth interviews, immersive fieldwork, and document analysis, to capture nuanced governance and funding dynamics within microenterprises.

Through this study, empirical support for signal theory also emerges within DAO financing, revealing philosophy, transparency, scalability, and robustness as signals of 'creditworthiness'. It also extends this framework by introducing the concept of 'on-chain governance capital', where voting participation, contributor engagement, and treasury transparency signal institutional sustainability.

In addition, this study provides Japan-specific empirical evidence on DAO adoption for microenterprises. Japan is in the budding stages, gaining valuable experience in overcoming legal and operational challenges for DAO operations. However, the relevance of this Japanese experience must extend beyond Japan, especially to any emerging economies where microenterprises are often viewed as too risky for external financiers. By filling the geographic research gap, it expands the understanding of DAO management for microenterprises around the world, while offering insights into novel governance structures for improving microenterprise financial accessibility.

Moreover, this study proposes an alternative financing strategy for microenterprises through DAO LLCs, which blends legal registration with community-driven dynamics. This is a hybrid financing model, combining traditional loans with DAO-enabled community funding mechanisms, providing an innovative framework for future microenterprise financing. The existing literature had not thoroughly investigated this integrated model, thus justifying additional theoretical exploration.

6.2.2 Practical Implications

(1) For microenterprise owners and entrepreneurs:

DAO integration may provide access to diversified funding, enhance stakeholder trust through transparent governance, and improve agility in decision-making. However,

adoption requires investment in governance training and adaptation to regulatory requirements.

DAO-integrated MSMEs present new avenues for financing diversification, especially in microenterprise sectors underserved by traditional finance. To ensure sufficient, timely, sustainable funding and maximize FCFs from a mid-to-long-term perspective, hybrid financing via DAOs may be an alternative strategy option for microenterprises. Initially, the recommended plan comprises:

- Documenting best practices across DAO LLCs to facilitate sectoral learning and innovation.
- Creating a DAO transition roadmap for conventional microenterprises considering DAO adoption.
- Supporting DAO functions through investments in digital infrastructure (e.g. governance tools, multisig wallets, treasury management/accounting, contribution/work management, communication/collaboration, smart contracts, membership/token distribution), security, and user training.
- Developing modular governance models that may scale with community participation while retaining core decision-making capacity.
- Setting up and incorporating a DAO LLC with basic digital tools for treasury and finance management (e.g. Gnosis Safe), governance and voting management (e.g. Snapshot), community management (e.g. Discord), identity and reputation systems (e.g. BrightID), incentives and rewards (e.g. Coordinape), legal and compliance support (e.g. OpenLaw), knowledge management (e.g. Notion), collaboration and development (GitHub).
- Utilizing DAO governance analytics tools to measure engagement, identify bottlenecks, and improve protocol design.

In addition, in order to take advantage of the features of a DAO LLC, microenterprise owners and entrepreneurs need to understand the practical differences between traditional organizations and DAO LLCs, listed in Table 6.1 below.

Table 6.1
Comparison of Traditional Organizations and DAO LLCs

Feature	Tradiotional organizations	DAO LLCs
Governance	Hierarchical structure with centralized decision-making	Distributed network with community-based decision-making
Decision-making	Top-down, often by a board of directors or management team	Through voting mechanisms, often using governance tokens
Transparency	Vary, but often limited to stakeholders	High transparency through public blockchain ledger
Operations	Rely on centralized infrastructure and intermediaries	Automated through smart contracts on decentralized networks
Intermediaries	Essential for various functions (e.g. financing)	Reduced reliance on traditional intermediaries

Source: Author's own compilation based on immersive fieldwork

On the other hand, the reality of failure is frequently disregarded in the excitement surrounding DAOs. Microenterprise owners and entrepreneurs need to understand that numerous DAOs cannot sustain engagement, lose control over governance, or collapse under internal conflict. Understanding common failure patterns is critical for informing better design and internal regulations. This study has implied several warning signs and risk clusters:

- *Governance apathy*: low voter turnout and lack of proposal activity may signal disengagement. In some DAOs, only a handful of participants control key decisions.
- *Treasury mismanagement*: poor budgeting, unclear spending protocols, or treasury drain due to hacks or insider manipulation may destabilize a DAO.
- *Mission drift*: DAOs that lack clearly articulated goals or evolve beyond their founding purpose without community consensus often experience fragmentation.

- *Over-reliance on technical gatekeepers*: when smart contract developers or multisig holders dominate governance, decentralization becomes performative.
- *Token volatility*: sudden drops in token value can reduce community morale, undermine incentives, and provoke exits.

Therefore, microenterprise owners and entrepreneurs also need to understand that DAO LLCs may mitigate these risks by:

- Establishing contingency plans and emergency governance procedures.
- Incorporating third-party audits and regular financial disclosures.
- Fostering a strong culture of accountability and transparency.
- Encouraging distributed leadership through role rotation and peer evaluations.
- Designing stablecoin-based compensation systems to reduce volatility exposure.

For external financing to be practical, it is recommended that microenterprise owners and entrepreneurs take a hybrid financing strategy to diversify the financing sources, including token-based community funding, conventional bank loans, and DeFi services, which exhibit high compatibility with transactions involving DAOs.

When applying for bank loans, they must articulate to the banks the specific countermeasures implemented to address their concerns. In practice, banks often raise issues such as the reliability of future cash flows, governance capacity, and compliance with regulatory requirements. By proactively demonstrating how these risks are identified and mitigated, borrowers can build credibility and enhance their prospects of obtaining necessary funding in a timely manner. This process not only facilitates access to finance but also fosters a more transparent relationship between microenterprises and the banks.

The banks' typical concerns on DAO management and the countermeasures to be taken by microenterprise owners may include:

- *Diluting the concentration of voting rights among DAO founders*: the countermeasure is to add an internal rule on the founders' right of veto to the most important agenda in the general assembly.
- *Limited data collection by the banks*: the countermeasure is to give the lender a right of access to the internal information at any time within the DAO's digital platforms.
- *Lower profitability*: the countermeasure is to take advantage of adopting a DAO for minimizing fixed costs, mainly including personnel costs and office costs so that break-even sales may be relatively low.
- *Lower operational efficiency*: the countermeasure is to make the most use of available digital tools for improving the operational efficiency of the DAO management.
- *Lack of employee training*: the countermeasure is to take advantage of DAO for developing human resources within a flat organization with workable incentive systems and clear role-sharing within the DAO community.

(2) For startup/MSME-focused banks and other financial institutions:

This study has revealed that the top three management elements improved by DAO adoption, i.e. philosophy, transparency, and sustainability, must be an advantage for microenterprises because these elements may help lenders verify the 'reliability' and 'trustworthiness' of their microenterprise customers. This must be one of the key lessons for SME bankers. Such a perspective may provide SME bankers with an opportunity to

consider DAOs as an effective mechanism for improving the operational efficiency of traditionally practiced ‘relationship banking’ and ‘community banking’.

For these SME bankers, DAO-integrated MSMEs present novel opportunities for portfolio diversification, particularly in emerging sectors. However, a key barrier to the broader adoption of DAO in microenterprises lies in the limited interface between decentralized organizations and conventional lenders. While several DAO LLCs have successfully opened corporate bank accounts or received small loans, most face obstacles ranging from a lack of legal clarity in the KYC procedure to an absence of standardized credit evaluation criteria.

The concept of ‘DAO-to-Bank Bridging’ refers to the development of frameworks and practices that enable smoother interaction between DAOs and banks. It is worth considering for startup/MSME-focused banks and other financial institutions to leverage DAOs as a framework for dramatically improving the operational efficiency of credit risk assessment and monitoring of microenterprise customers. By redesigning MSME credit assessment model for DAOs and integrating with DAO-based MSME business operations, the banks may access real-time, transparent, and verifiable business data so that ‘information asymmetry’ and the resulting collateral shortage problems will be solved to a significant degree. The recommended mechanism includes:

- *Legal identity and accountability*: banks require a clear legal counterparty. DAO LLCs address this partially, but banks still struggle to evaluate who is accountable in case of default or legal claims. Smart contract audits and signatory designations (e.g. multisig wallets) may help establish structured accountability.
- *Stakeholder participation by the bank*: banks may become DAO stakeholders of DAO-integrated microenterprise customers by holding governance or

utility tokens. This allows access to decision-making records, financial data, and key operational activities.

- *Real-time collection of financial data and cash position via smart contracts*: DAO operations on smart contracts may provide immediate visibility into sales/expenditures and transaction records (via wallet integration), cash flow dashboard and Key Performance Indicator (KPI) trigger (on-chain alarming system). Banks may integrate this data into internal credit risk assessment systems through APIs.
- *Customized DAO dashboard for lenders*: DAOs may offer lender-facing dashboards featuring monthly financial reports (i.e. auto-generated Profit and Loss Statement and Balance Sheet with Cash Flow Statement), activity logs of key executive members of the DAO, summaries of approved governance proposals (e.g. spending approvals). This dashboard supports the bank's real-time monitoring and post-loan supervision.
- *On-chain integration for off-chain data*: by aggregating operational and financial data, DAOs may collaborate with credit scoring service providers to generate on-chain credit ratings. Banks may incorporate these scores into loan approval and monitoring models.
- *Oracle integration for off-chain data*: to bridge off-chain data (e.g. POS data, payroll, inventory), DAOs may use software, for example, the Oracle Chainlink. Banks may trust verified data from the oracle data to enrich credit assessments.

The banks' benefits include: i) improved transparency (i.e. reduced information asymmetry leading to more accurate risk assessment); ii) continuous monitoring (i.e. real-time data reducing dependence on periodic reporting); iii) reduced default risk (i.e. early

warning signals allowing proactive risk mitigation); and iv) innovation positioning (i.e. early adoption to strengthen the bank's reputation in FinTech innovation).

The approach of banks' implementation requires the following steps: i) initiating pilot collaborations with selected DAO-structured MSMEs; ii) remodeling of internal frameworks for the MSME credit risk assessments; iii) training credit officers and risk managers in terms of blockchain and DAO fundamentals; and iv) engagement with regulators to ensure legal and compliance alignment.

Moreover, it is recommended that the banks and other financial institutions develop financial products that align with the DAO funding cycle, including revenue-sharing arrangements and milestone-based lending. This could be done by collaborating with flexible, tech-savvy neobanks and digital lenders. As a consequence, DAOs may present a powerful opportunity to transform bank's further engagement with MSMEs. This new model is likely to allow banks and other financial institutions to lower risks, increase MSME lending, and be financial innovators.

(3) For startup/MSME policymakers:

In the first place, startup/MSME policymakers should consider: i) providing legal clarity to encourage DAO adoption while mitigating risks; and ii) recognizing DAOs as alternative financial intermediaries that may complement existing MSME financing ecosystems. These measures could stimulate MSME innovation and resilience, particularly in environments where traditional MSME financing is limited.

From the viewpoint of legal institutionalization, the legal recognition of DAOs remains an evolving and fragmented domain across jurisdictions. In Japan, for instance, DAO LLCs function more as a creative workaround than as a purpose-built legal structure. These DAO entities can register as LLC under the Companies Act, with

internal governance rules referencing DAO frameworks, typically encoded in smart contracts or community protocols. Nonetheless, Japan has not yet introduced comprehensive legislation officially delineating or regulating DAOs. In this regard, Japan is one of the countries where the government has taken a swift approach by utilizing an existing corporate form as a 'legal wrapper' for DAOs.

One of the key regulatory challenges in Japan concerns the securities classification of tokens, which may trigger stringent compliance requirements under the Financial Instruments and Exchange Act and the Payment Services Act. Another challenge lies in reconciling the anonymity and pseudonymity inherent in DAOs with Japan's stringent KYC/AML (Anti-Money Laundering) framework. A potential solution to these challenges could be the development of tiered legal systems: i) basic registration of DAO LLCs under the Companies Act; ii) optional DAO status certification by a regulatory body; and iii) regulatory sandboxes for testing novel DAO designs.

This stands in contrast with pioneering efforts in other jurisdictions. The U.S. state of Wyoming passed a law (2021) that allows DAO LLCs to be recognized as legal entities, with rules for how they are run, registered, and how to handle disagreements. Similarly, Vermont (2018), Tennessee (2022) and Utah (2023) within the U.S., as well as the Marshall Islands (2022), have enacted relevant laws and regulations for DAOs with limited liability. Japan has seen progress, such as the Digital Agency's rules, but its regulations remain prudent.

Any emerging economies may take advantage of conducting bilateral regulatory discussions with jurisdictions, including the U.S., the United Kingdom, Japan, and others, to harmonize standards and mitigate regulatory arbitrage. Institutionalizing DAOs legally does not mean neutralizing their decentralized essence. Rather, it means articulating rights and responsibilities in ways that support innovation, protect participants, and

ensure accountability. Future DAO law in Japan should prioritize modular compliance, interoperable standards, and strong consumer protection, especially for microenterprise contexts. This circumstance would also be the case in emerging economies without robust legal systems governing DAOs.

Given such a global landscape of legal institutionalization, it is recommended that government agencies responsible for MSME development take a proactive approach to harness the potential of DAOs in improving MSME transparency, bankability, and financial inclusion. Governments may bolster the MSME financial ecosystem and digital innovation by updating pertinent regulations, overseeing financial institutions proactively, and creating policy-based loan programs specifically for DAO-structured MSMEs, especially microenterprises. This policy's implementation details include:

- *Establishing a regulatory framework for DAOs*: to ensure the safe and effective integration of DAOs into the MSME landscape, governments should do the following tasks to: i) define the legal status of DAOs (i.e. to recognize DAO-based MSMEs as a distinct legal entity or introduce a registration mechanism allowing DAOs to interface with traditional financial institutions); ii) set governance and disclosure standards (i.e. to require DAO-structured MSMEs to disclose key information such as tokenholder structures, decision-making processes, and financial flows); and iii) ensure consumer and investor protection (i.e. to introduce guidelines to mitigate fraud, mismanagement, or cybersecurity risks related to DAO participation).
- *Enhancing supervisory guidance for the banks*: as banks begin to assess and finance DAO-structured MSMEs, governments should do the following tasks: i) updating prudential guidelines (i.e. to encourage the use of verifiable on-chain data as part of credit assessment and risk monitoring); ii) facilitating

access to DAO-sourced data with the improved Open Banking framework (i.e. to work with technology providers to establish standardized dashboards or data-sharing protocols between MSMEs, DAOs, and banks); and iii) promoting innovation-safe compliance (i.e. to develop sandbox environments or pilot programs that allow banks to test DAO-integrated lending under monitored conditions).

- *Developing and operating policy-based loan programs for DAO-structured MSMEs*: governments may promote inclusive financing and digital innovation through: i) launching policy-based loan schemes (i.e. to provide concessional loans or guarantees to DAO-structured MSMEs with proven transparency and governance track records); ii) linking loan eligibility to DAO activity (i.e. to require DAO-structured MSMEs to meet minimum on-chain reporting and community governance standards); and iii) encouraging public-private partnerships (i.e. collaborating with commercial banks, fintech firms, and blockchain consortia to co-design and operate such loan programs).

To smoothly implement such policy-based loan programs for DAO-integrated microenterprises, it is necessary for startup/MSME policymakers to fully understand the practical challenges and risks of DAOs for microenterprises listed in Table 6.2 below.

Table 6.2
Challenges and Risks of DAOs for Microenterprises

Challenge/Risk	Description	Potential mitigation strategies
Governance challenges	Low participation, influence of large tokenholders, complexity of voting, governance attacks, presense of 'free riders'	Implement user-friendly voting interfaces, explore quadratic voting, establish clear rules for governance participation and dispute resolution.
Security risks and valunerabilities	Hacks, exploits, coding errors in smart contracts leading to financial losses	Rigorous smart contract audits by reliable firms, bug bounty programs, insurance protocols for smart contract failures.
Scalability limitations	Blockchain network capacity constraints leading to high fees and slow transaction	Explore layer-2 scaling solutions, consider alternative blockchain networks with higher throughput, optimize smart contract code for efficiency.
Regulatory uncertainty	Lack of clear legal frameworks for DAOs and DeFi that creates ambiguity and hinders adoption	Engage with policymakers to advocate for clear and adaptable regulations, explore compliance solutions tailored for decentralized entities.
User adoption barriers	Complexity of blockchain technology and DAO interfaces	Develop user-friendly interfaces, provide educational resources and support, build trust through transparency and community engagement.
Volatility of crypto assests	High volatility of cryptocurrencies, impacting capital value	Utilize stablecoins for capital reserves, implement hedging strategies where appropriate.
Lack of legal resource	Difficulty in resolving disputes or recovering funds in a decentralized system	Implement on-chain dispute resolution.

Source: Author's own compilation based on immersive fieldwork

The expected impact will include: i) improved MSME financial access through structured and transparent DAO operations; ii) increased trust between MSMEs and lenders, with upgraded monitoring and compliance mechanisms; and iii) fostered innovation and international competitiveness in digital MSME ecosystems.

DAOs may represent a promising vehicle for improving MSME governance, transparency, and financial access for MSMEs. With appropriate regulatory foundations and policy support, governments may unlock their potential while ensuring business innovations in the MSME sector. Therefore, startup/MSME policymakers are expected to take the following steps to: i) convene a multi-stakeholder working group on DAOs and MSME finance; ii) draft enabling legislation or regulatory guidelines for DAO registration and compliance; iii) design pilot projects involving DAO-based MSMEs,

banks, and government financial institutions; and iv) monitor outcomes and iterate policies for scale-up.

Furthermore, the Japanese experience suggests that policymakers should emphasize key considerations for the DAO-related policy preparation: i) education and capacity-building for DAO adoption; ii) cross-border DAO collaboration; iii) DAO-based model as a policy instrument for fostering the MSME sector and regional economic development; iv) environmental sustainability through DAOs; and v) diversity, equity, and inclusion in DAO governance, as elaborated below.

Education and capacity-building for DAO adoption: one of the most persistent barriers to DAO adoption in the microenterprise sector is the knowledge and capability gap. While early adopters are often digitally fluent or web3-native, the broader target population—including rural entrepreneurs, MSME owners, and local policymakers—may lack the technical, conceptual, and legal literacy to engage meaningfully in DAO governance.

DAO governance involves understanding smart contracts, multisig wallets, tokenomics, voting mechanisms, and the broader ethos of decentralized coordination. These ideas feel alien, even frightening to some people. Hence, systematic and multi-tiered education is essential.

At the grassroots level, municipalities and regional chambers of commerce may organize introductory workshops and acceleration programs demystifying blockchain, DAO use cases, and digital wallet setup. These programs might simulate governance decisions using physical tokens, enabling tactile understanding before digital onboarding. Libraries and local universities could host ‘DAO Days’ with panel discussions, live demos, and multilingual support.

For professional service providers—lawyers, accountants, IT consultants—more advanced certification programs may be developed in collaboration with bar associations or national tax bodies. These programs should cover topics such as DAO LLC formation, liability structures, taxation of tokens and crypto-assets, and smart contract auditing.

Higher education institutions may integrate DAO literacy into entrepreneurship, public policy, and computer science curricula. DAO simulation labs can serve as sandboxes for experimentation. Partnerships with global platforms such as Kernel, Bankless Academy, and ETHGlobal may provide country-specific content and foster cross-border dialogue.

Finally, relevant ministries could fund DAO literacy campaigns, produce open-source educational materials, and build DAO mentorship networks. These actions will spread information from institutions to both cities and rural areas, as well as to various communities.

Cross-border DAO collaboration: with the global maturation of DAO ecosystems, cross-border collaboration may take various forms. One model involves DAOs working together through smart contracts to manage shared resources or projects. These agreements may include dispute resolution protocols that incorporate both on-chain and off-chain elements—including legal mechanisms for enforcement in countries with advanced DAO initiatives. Alternatively, DAO LLCs in these countries may act as coordinators for international grant programs, facilitating token distributions while ensuring compliance with the financial and tax regulations.

Cross-border DAO collaboration also extends to talent exchange and governance experimentation. DAO developers and contributors may learn from global best practices in tokenomics and decentralized identity.

Given the international trends, Japan holds a unique position to strategically influence international DAO partnerships. Integrating legal DAO entities, such as DAO LLCs in Japan, builds a regulatory framework that many emerging economies need. This foundation might make Japan an attractive node for global DAO collaboration.

Japanese DAO LLCs also may link global blockchain efforts with local environments legally and operationally. For example, through clear jurisdiction, cultural knowledge, and governance adaptation, Japanese DAOs could assist international DAOs in entering East Asia. These bridging roles are especially significant in transnational initiatives addressing climate change, disaster response, and open-source software development.

Japan could potentially lead the establishment of interoperable legal standards for DAO-integrated MSMEs, in partnership with regions such as Wyoming (the U.S.) and other forward-thinking countries. Such standards can facilitate smoother cross-border collaboration and promote responsible DAO innovation worldwide.

DAO-based model as a policy instrument for fostering the MSME sector and regional economic development: in Japan, the DAO model has been widely recognized as a policy tool for the country's MSME and regional economic development. Japan faces acute regional challenges, such as depopulation, aging populations, and economic stagnation in rural areas. DAO LLCs may serve as a novel tool for addressing these issues by enabling localized governance, community-based investment, and digital community engagement. For instance, three illustrative models may be considered:

- *Tourism DAO*: local stakeholders (e.g. restaurants, tour guides) form a DAO LLC to manage pooled resources for destination marketing, event funding, and infrastructure improvement. Token incentives may reward volunteer guides, content creators, or customer referrals.

- *Agriculture DAO*: a cooperative of small-scale farmers creates a DAO to manage supply chain logistics, access small loans for equipment, and coordinate collective purchasing. Smart contracts ensure transparent revenue sharing and traceable food provenance.
- *Public service DAO*: a municipality partners with residents to co-manage public budgets for parks, disaster preparedness, or cultural preservation. On-chain voting allows real-time feedback and participatory budgeting.

This may apply to other countries facing similar social challenges. However, these regional DAOs require the following supportive infrastructure as prerequisites:

- Internet connectivity and mobile accessibility.
- Legal templates and accounting services tailored for DAO LLCs.
- Government grants or matching funds to bootstrap activity.
- Intermediaries (e.g. DAO hubs or accelerators) to facilitate onboarding and training.
- Developing and operating policy-based loan programs for DAO-integrated MSMEs.

DAO-integrated MSMEs are likely to revitalize civic engagement and build digital bridges between urban investors and rural communities. Such models may transform passive recipients of aid into active co-creators of their local futures in the country.

Environmental sustainability through DAOs: environmental projects may be organized, funded, and managed in a new way using DAOs, because climate change is getting worse and people need solutions for a better environment. Environmental DAOs, also known as 'green DAOs', may utilize blockchain's transparency, programmability, and global reach to coordinate collaborative initiatives among distributed stakeholders.

Given Japan's issues of rural exodus, forest decline, and biodiversity loss, DAO LLCs might be crucial for local ecological management. DAOs are inherently borderless, but legal, cultural, and infrastructural barriers often constrain their ability to scale in the country and internationally.

An example is renewable energy cooperatives. Communities may establish DAO LLCs to manage solar microgrids, pooling resources to purchase and maintain infrastructure. Governance tokens may be allocated by contribution, and decisions about maintenance, pricing, or surplus energy sales could be made together. These models may cut red tape and boost energy stability by coding local choices. The opportunity exists within a collective financial infrastructure. Banks and fintech firms may work with global DAOs to create compliance-friendly wallets, fiat on-ramps, and KYC-light identity solutions that respect privacy while satisfying regulators.

Agricultural DAOs also hold promise. In aging rural communities, DAO LLCs could manage shared farming equipment, coordinate organic certification, and crowdsource funding for sustainable irrigation systems. Transparency in fund flows and decision-making may help build trust among farmers traditionally wary of financial technologies. However, cultural translation is critical. English-centric DAO platforms often alienate non-native speakers. Governments might be expected to invest in DAO localization platforms that offer multilingual interfaces, culturally relevant metaphors, and context-specific governance templates. This not only facilitates inbound participation but allows DAOs to export their practices.

Japan's 'Satoyama' or conservation movement—centered on maintaining the balance between human activity and natural ecosystems—might be a philosophical anchor for DAO environmental governance. DAO constitutions could gain legitimacy and partnerships with regional governments and non-governmental organizations (NGOs)

by including Satoyama principles. A 'DAO Rating and Review System' could also be developed, assessing transparency, inclusiveness, impact, and resilience. Such scores would be valuable for investors, users, and policymakers.

Globally, models such as KlimaDAO (focused on carbon credits) and Regen Network (for ecological data validation) offer templates. However, DAO LLCs must adapt these blueprints to local regulatory frameworks and cultural expectations. DAO-based environmental projects also face risks such as token speculation and ecological greenwashing. Mitigation strategies include multi-stakeholder governance, third-party environmental audits, and non-transferable reputation tokens tied to verified outcomes.

In brief, environmental DAOs are potent tools. Through considered design and solid partnerships, DAO LLCs could lead a new era of decentralized environmental management.

Diversity, equity, and inclusion in DAO governance: while DAOs are often praised for the potential to democratize decision-making, the actual implementation of diversity, equity, and inclusion (DEI) principles is a challenge within DAOs. This study's observations reveal that, although DAOs may reduce hierarchical barriers, they do not automatically guarantee fair participation.

Inclusion may be hindered by both structural and cultural factors. Digital literacy, platform design, and voting systems may create accessibility gaps. Also, governance models that use tokens may let early investors have too much power and make it difficult for some to be heard. To promote inclusion, DAOs need to take proactive steps to:

- Adopt multilingual interfaces and outreach strategies.
- Design governance models that recognize non-financial contributions, such as time, knowledge, or community leadership.

- Use rotating governance roles or delegation systems to diversify power centers.
- Implement mentorship programs and educational resources targeted at underrepresented groups.
- Develop DAO-wide DEI metrics and dashboards to track inclusivity over time.

By embedding DEI considerations into their founding protocols, DAOs may become more reflective of the communities they intend to serve. This is particularly vital in the microenterprise sector, where diverse stakeholder engagement may be linked to greater innovation and resilience.

6.3 Recommendations for Future Research

This study has several limitations that define the scope of its findings. The empirical evidence is based on a small number of case studies (N = 9) and dependent on Japan's context, which restricts generalizability. The reliance on self-reported interview data also raises the possibility of response or interpretation bias. Additionally, as the DAO ecosystem continues to evolve rapidly, some insights may become less applicable over time.

To deepen understanding of the DAO's potential to help microenterprises improve financial access and a DAO-enabled alternative financing strategy for microenterprises, future studies could explore:

- *Longitudinal studies tracking DAO LLCs*: follow-up observation of the nine Japanese DAO LLCs over multiple years to assess sustainability, governance evolution, and financial performance.

- *Online questionnaire survey (larger samples)*: online questionnaire survey focusing widely on for-profit DAOs out of over 200 DAOs operating in Japan, as well as DAO LLCs with commercial purposes.
- *Quantitative analysis using financial statements of DAOs*: quantitative analyzes correlating DAO features with funding outcomes. The data analysis methods should focus on such variables as: i) dependent variables (e.g. debt ratio; gearing ratio; loan acquisition; loan interest rates; diversity of financing sources [number of different financing sources]), ii) independent variables (e.g. transparency and other key DAO-related features), and iii) control variables (firm size [number of employees, the sales, total capital]; industry type; business history [years since establishment]). The statistical techniques may include: i) descriptive statistics (e.g. mean, median, and standard deviation of key financial indicators; distribution analysis of funding sources before and after DAO integration), ii) comparative analysis (e.g. paired t-tests to compare financial performance before and after DAO integration; Analysis of Variance [ANOVA] to test whether financial performance differs significantly across different DAO forms), and iii) correlation and regression analysis (e.g. multiple linear regression [MLR] to estimate the impact of DAO integration on financial access while controlling for firm size, industry type, and business history; logistic regression to analyze the likelihood of loan acquisition based on DAO-driven managerial competencies).
- *Comparative case studies*: comparative case studies of DAO LLCs across different jurisdictions. This study investigates how different regulatory frameworks may influence DAO behavior, funding outcomes, and survival rates.

6.4 Conclusion

This dissertation set out to explore whether DAOs, particularly DAO LLCs incorporated with legal personality, could serve as an alternative financing mechanism for microenterprises. Drawing on a systematic literature review and nine case studies of Japanese DAO LLCs, the study has provided both theoretical and empirical insights into how DAOs operate and what opportunities and challenges they present.

The findings demonstrate that DAOs have the potential to address persistent financing gaps for microenterprises by leveraging community engagement, transparent governance, and DeFi platforms. These features may reduce information asymmetry and reliance on collateral, which traditionally constrain microenterprise access to external finance. However, the study also identified limitations, including immature treasury management, legal uncertainty, and the difficulty of creating sustainable business models under current regulatory conditions.

The contribution of this study is twofold. First, it extends theoretical discussions in MSME finance by illustrating how DAO-based mechanisms intersect with established concepts such as relationship lending, community-based financing, and collective governance. In doing so, it positions DAOs not as replacements but as complementary models that may enrich the theory of MSME finance. Second, it provides practical and policy-oriented insights by highlighting Japan as an early institutional laboratory for DAO incorporation. Japan's experience with microenterprises has valuable lessons for other countries, especially emerging economies, which often struggle with microenterprise financing and a lack of trust in financial institutions.

The study concludes that DAOs represent a promising, though still emerging, pathway for improving access to finance within the microenterprise sector. Their broader adoption will depend on regulatory clarity, institutional experimentation, and integration

with existing financial systems such as community banking models. By bridging blockchain-enabled transparency with traditional mechanisms of trust and oversight, DAOs may ultimately contribute to more inclusive and resilient MSME ecosystems.

REFERENCES

Atzori, M., 2015. Blockchain Technology and Decentralized Governance: Is the State Still Necessary?

Bank for International Settlements (BIS), 2019. Basel Committee on Banking Supervision - Report on open banking and application programming interfaces.

Bansal, A., Swamy, S.R., 2020. Review: Impact of Blockchain Technology in Lending. International Research Journal of Engineering and Technology 2425–2427.

Beltrame, F., Grassetti, L., Bertinetti, G.S., Sclip, A., 2023. Relationship lending, access to credit and entrepreneurial orientation as cornerstones of venture financing. Journal of Small Business and Enterprise Development 30, 4–29. https://doi.org/10.1108/JSBED-07-2021-0281

Berger, A.N., Frame, W.S., 2005. Small Business Credit Scoring and Credit Availability.

Berger, A.N., Udell, G.F., 2004. A More Complete Conceptual Framework for SME Finance.

Berger, A.N., Udell, G.F., 2002. Small business credit availability and relationship lending: The importance of bank organisational structure. The Economic Journal 112, F36–F43. https://doi.org/10.1111/1468-0297.00682

Bjellerås, A.S.B.E., 2023. Best Practices in Decentralized Autonomous Organization (DAO) Venture Capital - A Bibliometric Analysis and Systematic Review.

BlockStand, de la Roche W. Consulting, 2025. Comparative Analysis Report: Legal Frameworks for DAOs.

Boss, S., 2023. DAOS: LEGAL AND EMPIRICAL REVIEW.

Boumghar, R., Aksenov, I., Ceglarek, J.-P., Reccardi, A., Cowlishaw, R., El, C., Many-Girardot, D., 2024. Decentralized And Neutral Consensus Mechanisms in Space Conjunctions Assessment and Mitigation: Space DAO STM.

Brzezinski, A., 2023. Specificity of Decentralized Autonomous Organizations as the Implementation of Blockchain Technology, in: Procedia Computer Science. Elsevier B.V., pp. 4371–4374. https://doi.org/10.1016/j.procs.2023.10.434

Catalini, C., Gans, J.S., 2020. Some simple economics of the blockchain. Commun ACM 63, 80–90. https://doi.org/10.1145/3359552

Chang, V., Baudier, P., Zhang, H., Xu, Q., Zhang, J., Arami, M., 2020. How Blockchain can impact financial services – The overview, challenges and recommendations from expert interviewees. Technol Forecast Soc Change 158, 1–6. https://doi.org/10.1016/j.techfore.2020.120166

Chen, B., Luo, Y., Li, J., Li, Y., Liu, Y., Yang, F., Bo, J., Qiao, Y., 2023. Blockchain-based Decentralized Co-governance: Innovations and Solutions for Sustainable Crowdfunding 1–3.

Chen, H., 2023. Blockchain Technology and Small and Medium Enterprises Access to Finance. Advances in Economics, Management and Political Sciences 8, 138–144. https://doi.org/10.54254/2754-1169/8/20230297

Coalition of Automated Legal Applications (coala), 2021. Model Law for Decentralized Autonomous Organizations (DAOs).

Colangelo, G., Khandelwal, P., 2025. The many shades of open banking: A comparative analysis of rationales and models. Internet Policy Review 14 (1), 2. https://doi.org/10.14763/2025.1.1821

Cui, L., Bulis, A., 2023. EXPLORATION ON FINANCING STRATEGIES OF SMALL AND MEDIUM-SIZED ENTERPRISES APPLYING THE BLOCKCHAIN

TECHNOLOGY, in: 13th International Scientific Conference “Business and Management 2023.” Vilnius Gediminas Technical University, pp. 302–305. https://doi.org/10.3846/bm.2023.1068

DeepDAO, 2025. DeepDAO Organizations [WWW Document]. URL http://deepdao.io/organizations (accessed 4.4.25).

Digital Agency of Japan, 2023. Briefing Paper on Web3 Research Group DAOs, in: Digital Agency of Japan (Ed.), . Tokyo, pp. 1–11.

Digital Agency of Japan, 2022. Web3.0 Research Group’s Report ~Toward sound development of Web3.0 (Web3.0 研究会報告書 ～Web3.0 の健全な発展に向けて). Tokyo.

Elyasiani, E., Goldberg, L.G., 2004. Relationship lending: A survey of the literature. J Econ Bus 56, 315–330. https://doi.org/10.1016/j.jeconbus.2004.03.003

Fujii, K., 2022. SME Credit Rating in Financial Institutions (金融機関における中小企業信用格付けについて) 53–60.

Gaiax Co. Ltd., 2025. Blockchain Biz: DAO Portal（DAOポータル） [WWW Document]. URL http://gaiax-blockchain.com/dao-portal (accessed 4.18.25).

Gaiax Co. Ltd., 2024. Japan DAO Chaos Map 2024（国内DAOカオスマップ2024） [WWW Document]. URL http://gaiax.co.jp/pr/press-05222024 (accessed 4.18.25).

Galassi, F.L., Newton, L.A., 2001. MY WORD IS MY BOND: REPUTATION AS COLLATERAL IN NINETEENTH CENTURY ENGLISH PROVINCIAL BANKING.

Han, J., Lee, J., Li, T., 2025. A Review of DAO Governance: Recent Literature and Emerging Trends.

Hashemi-Khiabani, S.S., Polónia, D.F., 2023. Improving Corporate Governance Using DAO, in: International Joint Conference on Knowledge Discovery, Knowledge

Engineering and Knowledge Management, IC3K - Proceedings. Science and Technology Publications, Lda, pp. 150–156. https://doi.org/10.5220/0012164600003598

Hein, S.E., Koch, T.W., Macdonald, S.S., 2005. Economic Review First Quarter 2005: On the Uniqueness of Community Banks. Federal Reserve Bank of Atlanta 20.

Hurley, M., Adebayo, J., 2016. CREDIT SCORING IN THE ERA OF BIG DATA, Yale Journal of Law and Technology.

Husriadi, Muh., Bahar, H., Windayani, W., 2024. CRITICAL REVIEW OF THE USE OF BLOCKCHAIN TECHNOLOGY IN IMPROVING MSME DATA TRANSPARENCY AND SECURITY. Journal of Finance, Economics and Business 3, 53–60. https://doi.org/10.59827/jfeb.v3i1.107

International Finance Corporation, 2017. MSME FINANCE GAP: ASSESSMENT OF THE SHORTFALLS AND OPPORTUNITIES IN FINANCING MICRO, SMALL AND MEDIUM ENTERPRISES IN EMERGING MARKETS. Washington, DC.

Japan DAO Association, 2025a. Home of Japan DAO Association [WWW Document]. URL http://jpdao.org (accessed 4.22.25).

Japan DAO Association, 2025b. Preparatory Study Meeting for the 2nd Risk Review Program (第二回リスクレビュープログラム 事前勉強会). Tokyo.

Japan DAO Association, 2024. DAO LLC in Japan (合同会社型DAO). Tokyo.

Jiang, E., Qin, B., Wang, Q., Wang, Z., Wu, Q., Weng, J., Li, X., Wang, C., Ding, Y., Zhang, Y., 2023. Decentralized Finance (DeFi): A Survey 1–7.

Karakostas, I., Pantelidis, K., 2024. DAO Dynamics: Treasury and Market Cap Interaction. Journal of Risk and Financial Management 17, 1–19. https://doi.org/10.3390/jrfm17050179

Kumar, D., Phani, B.V., Chilamkurti, N., Saurabh, S., Ratten, V., 2023. Filling the SME credit gap: a systematic review of blockchain-based SME finance literature. Journal of Trade Science 11, 45–72. https://doi.org/10.1108/jts-06-2023-0003

Küng, L., Giaglis, G.M., 2024. DAOs' Business Value from an Open Systems Perspective: A Best-Fit Framework Synthesis.

Li, J., 2022. Venture financing risk assessment and risk control algorithm for small and medium-sized enterprises in the era of big data. Journal of Intelligent Systems 31, 613–616. https://doi.org/10.1515/jisys-2022-0047

Li, J., Qin, R., Wang, F.Y., 2023. The Future of Management: DAO to Smart Organizations and Intelligent Operations. IEEE Trans Syst Man Cybern Syst 53, 3389–3399. https://doi.org/10.1109/TSMC.2022.3226748

Lustenberger, M., Spychiger, F., Küng, L., Bassi, E., Wollenschläger, S., 2025. DAO Research Trends: Reflections and Learnings from the First European DAO Workshop (DAWO). Applied Sciences (Switzerland). https://doi.org/10.3390/app15073491

Lux, M., Greene, R., 2015. M-RCBG Associate Working Paper Series No. 37: The State and Fate of Community Banking.

Morrison, R., Mazey, N.C.H.L., Wingreen, S.C., 2020. The DAO Controversy: The Case for a New Species of Corporate Governance? Frontiers in Blockchain. https://doi.org/10.3389/fbloc.2020.00025

Nemoto, T., 2022. Advancement of Fintech and Alternative Finance (Fintechの進展とオルタナティブファイナンス). Research Bureau 論究 No.19, 29–31.

OECD, 2024. Financing SMEs and Entrepreneurs 2024: An OECD Scoreboard. Paris.

OECD, 2019. OECD SME and Entrepreneurship Outlook 2019. Paris.

Ostrom, E., 1992. Governing the Commons: The Evolution of Institutions for Governing the Commons: The Evolution of Institutions for Collective Action Collective Action. Nat Resour J 32.

Pawlowski, A.M., 2024. Decentralized Autonomous Organizations (DAOs) as Innovative Means to Supplement Transition Governance. pp. 89–99. https://doi.org/10.1007/978-3-658-44114-2_7

Pechlivanidis, D., 2022. The Case of Venture DAOs and the Future of Decentralized Venture Capital.

Rauchs, M., Blandin, A., Klein, K., Pieters, G., Recanatini, M., Zhang, B., 2018. Second Global Cryptoasset Benchmarking Study.

Rikken, O., Janssen, M., Kwee, Z., 2023. The ins and outs of decentralized autonomous organizations (DAOs) unraveling the definitions, characteristics, and emerging developments of DAOs. Blockchain: Research and Applications 4, 3–8. https://doi.org/10.1016/j.bcra.2023.100143

Riva, S., 2019. Decentralized Autonomous Organizations (DAOs) as subjects of law: The recognition of DAOs in the Swiss legal order.

Santana, C., Albareda, L., 2022. Blockchain and the emergence of Decentralized Autonomous Organizations (DAOs): An integrative model and research agenda. Technol Forecast Soc Change 182, 3–10. https://doi.org/10.1016/j.techfore.2022.121806

Santana, C., Mikalef, P., 2024. Exploring Decentralized Autonomous Organization (DAO) Governance: An integrative literature review.

Shacheendran, V., Lukose, A., John, J., Joseph, D., Joseph, J., 2025. The Rise of Open Banking: A Comprehensive Analysis of Research Trends and Collaborative

Networks. International Journal of Economics and Financial Issues 15 (1), 295–297. https://doi.org/10.32479/ijefi.17407

SME Agency of Japan, 2024. Current Situation and Issues Surrounding Microenterprises in Japan (小規模事業者を取り巻く現状と課題について). Tokyo.

Storey, D.J., 1994. UNDERSTANDING THE SMALL BUSINESS SECTOR. New York.

Strnad, J., 2024. Economic DAO Governance: A Contestable Control Approach 1–5.

UK Law Commission, 2024. Decentralised autonomous organisations (DAOs): A scoping paper.

UK Law Commission, 2022. Decentralised autonomous organisations (DAOs): Call for Evidence.

Uwaizumi, Y., 2024. What is a DAO LLC? - What are the business opportunities and effective application cases of a DAO with legal personality? (合同会社型DAOとは？〜法人格を持ったDAOのビジネスチャンスと有効な適用ケースは〜) [WWW Document]. NEC “Web3 Community Round-Table Discussion” (October 2024). URL http://wisdom.nec.com/ja/feature/web3/2024112701/index.html#:~text=今回のテーマは「DAO,が可能となった%E3%80%82 (accessed 4.25.25).

Wang, A., 2025. The Feasibility of Decentralized Social Governance: Can DAO Replace Traditional Government Organizations? Digital Society & Virtual Governance 41–47. https://doi.org/10.6914/dsvg.010103

Williamson, O.E., 1985. THE ECONOMIC INSTITUTIONS OF CAPITALISM: FIRMS, MARKETS, RELATIONAL CONTRACTING. New York.

Wright, A., De Filippi, P., 2015. DECENTRALIZED BLOCKCHAIN TECHNOLOGY AND THE RISE OF LEX CRYPTOGRAPHIA.

Yabushita, S., Bushimata, T., 2002. Introduction to Small Business Finance (中小企業金融入門). Toyo Keizai, Tokyo.

Yoshino, N., 2011. Japanese Banks' Decision Making Process in SME Lending: An analysis of the SME database and the utilization of investment and trust funds for SME financing (中小企業における銀行の融資決定メカニズム・中小企業データ分析と中小企業へのリスクマネーの提供). RIETI Discussion Paper Series 11-J-028, 1–6.

Zetzsche, D.A., Arner, D.W., Buckley, R.P., 2020. Decentralized finance. Journal of Financial Regulation 6, 172–203. https://doi.org/10.1093/jfr/fjaa010

Zichichi, M., Contu, M., Ferretti, S., D'Angelo, G., 2019. LikeStarter: A Smart-contract based Social DAO for Crowdfunding, in: INFOCOM 2019 - IEEE Conference on Computer Communications Workshops, INFOCOM WKSHPS 2019. Institute of Electrical and Electronics Engineers Inc., pp. 313–318. https://doi.org/10.1109/INFCOMW.2019.8845133

APPENDIX A:

REQUEST LETTER AND QUESTIONNAIRE OF IN-DEPTH INTERVIEW SURVEY

1. Letter of Request for In-depth Interview Survey (in Japanese)

DAO 関係者の皆様へ

インタビュー調査ご協力のお願い（2025 年 7 月）

大場由幸 と申します。中小企業金融の領域で約 30 年間の実務経験を経て、現在、ジュネーブに所在する大学（Swiss School of Business & Management Geneva）にて博士論文の準備を進めております。論文テーマは、「DAO を活用した小企業のオルタナティブな財務戦略：日本の事例研究からの洞察」（An alternative financing strategy for microenterprises through DAOs: International insights from a Japanese case study）です。

現在、日本 DAO 協会のご支援の下、日本の合同会社型 DAO 関係者の皆様から DAO 運営に伴う経営全般や資金調達面への影響、成功要因及び課題についてお伺い致したく、インタビュー調査（オンライン、所要時間は約 1〜1.5 時間）を実施させていただいております。

ご多忙中とは存じますが、是非、このインタビュー調査にご協力いただけますようお願い申し上げます。ご協力いただいた皆様へは、後日、本調査の報告書をお届けさせて頂きます。

2. Questionnaire of In-depth Interview Survey (in Japanese)

本インタビュー調査では、次の 10 の質問項目があります（所要時間は約 1〜1.5 時間）。なお、最後の「補足：最近期の財務数値」につきましては、ご回答いただける方は最近期の決算書をお手元にご準備ください。

1. 事業概要
2. DAO 組織の概要
3. DAO による資金調達全般への影響
4. DAO による経営力への影響
5. DAO による資金アクセス改善の要因
6. DAO による金融機関ローンへの影響
7. DAO による金融機関ローンへの影響に関する詳細
8. DAO による金融機関ローン拡充の要因
9. DAO 経営の成功要因
10. DAO 経営の課題

補足： 最近期の財務数値

まずは、以下をご教示ください。

- お名前：（　　）
- 所属・役職：（　　）
- E メールアドレス：（　　）

質問 1：事業概要

DAO 運営を開始される以前から既存事業をお持ちの方、あるいはお持ちだった方は、以下、ご回答ください。そうでなければ、質問 2 へお進みください。

1-1 会社名（個人事業主の場合はお名前）：（　　）

1-2 設立年月：西暦（　　）年（　　）月

1-3 業種：建設業、製造業、卸売業、小売業、宿泊業・飲食サービス業、不動産業、物品賃貸業、学術研究・専門技術サービス業、生活関連サービス業・娯楽業、他に分類されないサービス業、医療・福祉、運輸業・郵便業、情報通信業、農業・林業、漁業、鉱業・採石業・砂利採取業、電気・ガス・熱供給・水道業、教育・学習支援業、複合サービス事業、金融・保険業

1-4 製品・サービス：（　　）

1-5 所在地：（　　）都道府県

1-6 会社形態：個人事業主、株式会社、合同会社、その他（　　）

1-7 従業員数：（　　）名

1-8 資本金：（　　）円

質問 2：DAO 組織の概要

2-1 DAO 名：（　　）

2-2 設立年月：西暦（　　）年（　　）月

2-3 組織形態：法人格のない DAO、法人格を持つ合同会社型 DAO

2-4 DAO 活用方法：既存会社を DAO に組織変更、既存の会社/個人自営業と新規設立した DAO を並行して運営、初めて事業を立ち上げるに際し DAO を設立・運営、その他（　　）

2-5 DAO 事業の内容：（　　）

2-6 DAO コミュニティメンバー数：（　　）名

2-7 従業員数：（　　）名

2-8 時価総額：（　　）円

2-9 そのうち創業者チームの持分：（　　）%

質問 3：DAO による資金調達全般への影響

3-1 DAO の運営開始前と開始後で、資金調達全般に対する DAO の影響度は如何ですか？あるいは、今後、影響度はどうなりそうですか？：非常に小さい、小さい、中程度、大きい、非常に大きい

質問 4：DAO による経営力への影響

DAO の運営開始前と開始後で、経営力に対する DAO の影響度について伺います。以下、それぞれの経営要素に対する DAO の影響度は如何ですか？あるいは、今後、影響度はどうなりそうですか？

4-1 経営哲学（例：単なる営利目的から社会の公器という理念への転換、ESG（環境・社会・ガバナンス）の強化、社会的価値の提供、長期利益の最大化等）：非常に小さい、小さい、中程度、大きい、非常に大きい

4-2 透明性（例：ガバナンス強化、情報開示、不正予防、サプライチェーンの見える化等）：非常に小さい、小さい、中程度、大きい、非常に大きい

4-3 効率性（例：意思決定にかかる時間の短縮、事業コラボレーションや操業にかかる時間の短縮等）：非常に小さい、小さい、中程度、大きい、非常に大きい

4-4 公平性（例：従業員や利害関係者にとっての対等な契約、コミュニティメンバーの公平なリターン（高成長型スタートアップにおけるストックオプションのような報酬トークン等）：非常に小さい、小さい、中程度、大きい、非常に大きい

4-5 成長性（例：国内外の顧客基盤の拡大等）：非常に小さい、小さい、中程度、大きい、非常に大きい

4-6 頑強性（例：ビジネスのファン・コミュニティメンバー・利害関係者、その他支援者による事業基盤の強化等）：非常に小さい、小さい、中程度、大きい、非常に大きい

4-7 持続性（例：事業承継、100 年企業等）：非常に小さい、小さい、中程度、大きい、非常に大きい

4-8 その他、DAO により影響を受けたと感じられる経営要素があればご記載の上、その影響度も選択してください。

（　　）：　非常に小さい、小さい、中程度、大きい、非常に大きい

質問 5：DAO による資金アクセス改善の要因

5-1 上述の経営要素、すなわち経営哲学、透明性、効率性、公平性、成長性、頑強性、持続性、ご記載されていれば「その他」のうち、資金アクセス改善に役立つのはどの経営要素と思われますか？役立つと思われる上位 3 つの経営要素を選択してください。

１位：経営哲学、透明性、効率性、公平性、成長性、頑強性、持続性、その他

２位：経営哲学、透明性、効率性、公平性、成長性、頑強性、持続性、その他

３位：経営哲学、透明性、効率性、公平性、成長性、頑強性、持続性、その他

質問 6：DAO による金融機関ローンへの影響

6-1 DAO の運営開始前と開始後で、金融機関ローンに対する DAO の影響度は如何ですか？：非常に小さい、小さい、中程度、大きい、非常に大きい

（注）DAO 開始前からの会社（株式会社、個人事業主等）を今も継続されている方は、その会社の状況を DAO 開始前後で比較してください。DAO 開始時に従前の会社を解散された方は、従前の会社と現在の DAO を比較してください。

質問 7：DAO による金融機関ローンへの影響に関する詳細

DAO の運営開始前と開始後で、金融機関の取引状況に対する DAO の影響度（あるいは、将来予想される影響度）に関し、以下の各項目について適当と思われる選択肢をお選びください。

7-1 負債比率（負債／総資産）：下降、変化なし、上昇

7-2 中長期ローン比率（中長期ローン／総資産）：下降、変化なし、上昇

7-3 ギアリング比率（有利子負債／自己資本）（注）有利子負債とは短期ローン、中長期ローン、社債等です：下降、変化なし、上昇

7-4 金融機関の種類（複数回答可）：都市銀行、地方銀行、信用金庫、信用組合、日本政策金融公庫、日本政策投資銀行、商工中金、P2P オンライン貸出事業者、クラウドファンディング、DeFi サービス事業者、その他（　　）

7-5 金融機関との交渉力：弱くなった、変化なし、強化された

7-6 短期ローン（残高）：短期ローンを調達したことはない、減少、変化なし、増加

7-7 短期ローンの金利水準：下降、変化なし、上昇

7-8 設備投資のための中長期ローン（残高）：設備投資のための中長期ローンを調達したことはない、減少、変化なし、増加

7-9 上記質問に関し「増加」を選択された方は、担保は必要でしたか？：はい、いいえ

7-10 上記「担保」に関する質問に関し、「はい」を選択された方は、担保の対象物は何ですか？（複数回答可）：不動産、信用保証、その他（　　）

7-11 上記質問に関して「信用保証」を選択された方は、保証人はどなたですか？（複数回答可）：信用保証協会、会社のオーナー経営者、会社オーナー経営者の親族、会社オーナー経営者の友人、その他（　　）

質問 8：DAO による金融機関ローン拡充の要因

8-1 上述の経営要素、すなわち経営哲学、透明性、効率性、公平性、成長性、頑強性、持続性、ご記載されていれば「その他」(4-8)のうち、金融機関ローンの拡充に役立つのはどの経営要素と思われますか？役立つと思われる上位３つの経営要素を選択してください。

１位：経営哲学、透明性、効率性、公平性、成長性、頑強性、持続性、その他

２位：経営哲学、透明性、効率性、公平性、成長性、頑強性、持続性、その他

３位：経営哲学、透明性、効率性、公平性、成長性、頑強性、持続性、その他

質問 9：DAO 経営の成功要因

9-1 DAO 経営にかかる成功要因は何だと思われますか？

（　　）

質問 10：DAO 経営の課題

10-1 DAO 経営にかかる課題は何だと思われますか？（例：経営の論点について合意形成が難しい、リーダーシップの発揮が困難等）

（　　）

補足：最近期の財務数値

ご回答いただける方は、運営されている DAO の最近期の決算書の数値（以下、単位：円）をご教示ください。なお、第 1 期目の決算が終了していない場合はご回答いただく必要はありません。

西暦（　　）年（　）月期決算

<u>損益計算書</u>

売上：（　　）

営業利益：（　　）

経常利益：（　　）

法人税等：（　　）

純利益：（　　）

利息収入：（　　）

利息支払料：（　　）

減価償却費：（　　）

配当：（　　）

<u>貸借対照表</u>

総資産：（　　）

固定資産：（　　）

負債：（　　）

固定負債：（　　）

有利子負債（ローン・社債等）：（　　）

短期ローン：（　　）

中長期ローン：（　　）

自己資本：（　　）