Longitudinal evidence of entrepreneurial behaviour in a blockchain-based decentralized autonomous organization: Case study of the Nano cryptocurrency

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A B S T R A C T
Objective: The article aims to investigate how entrepreneurial behaviour among members of decentralized autonomous organizations (DAO) changes over time. Decentralized autonomous organizations allow for the creation of distributed organizations driven by organizational entrepreneurship, many of which are based on blockchain technology. The self-organization of DAO members and their entrepreneurial behaviour are crucial to the organization's development. Research on entrepreneurial behaviour in DAOs is scarce. Cryptocurrency markets, blockchain technologies, and community sentiment can evolve rapidly, making it important to longitudinally research such organizations and the entrepreneurship among their members.
Research Design & Methods: We formulated research propositions and combined qualitative and longitudinal interviews with entrepreneurially active members of a DAO with data science-based sentiment analysis of the main Nano community over the course of 16 months.
Findings: The entrepreneurial behaviour of DAO members can hinge on external circumstances, such as the health of the overall cryptocurrency market. Partly resulting from a crypto downturn, some of Nano's entrepreneurially active members reduced their engagement and stopped or downsized their conduction of entrepreneurial tasks. This change was also linked to lower levels of community activity and deteriorating sentiment scores. Entrepreneurial tasks such as marketing or outreach to customers were conducted to a lesser extent. The resulting picture is one of a fluid state of entrepreneurship within this DAO. We also found internal factors influencing entrepreneurial behaviour, especially related to the distinction between technology-oriented and market-oriented members and their changing levels of activity.
Implications & Recommendations: The findings highlight the influence of external factors – such as the health of the cryptocurrency market – on the entrepreneurial behaviour of DAO members. This suggests that the success and engagement of entrepreneurial individuals within a DAO can be subject to volatility and fluctuations in the broader market, emphasizing the need for adaptability and resilience.
Contribution & Value Added: This is one of the first articles to address the connection between entrepreneurship and DAOs based on blockchain. In doing so, it benefits from a unique data set comprising quantitative and qualitative elements.

Article type:	research article
Keywords:	blockchain; decentralized autonomous organization; entrepreneurship; financial technology; entrepreneurial behaviour; financial markets
JEL codes:	L26, G32, D85

Received: 26 June 2023	Revised: 31 July 2023	Accepted: 19 September 2023

INTRODUCTION

According to Mises (1996), entrepreneurship is inherent in every action and is executed as a function. Firm founders can perform this function or delegate it to managers or employees (Freiling, 2006; Freil-

ing & Reckenfelderbäumer, 2010). The understanding of entrepreneurship as a function to be executed is particularly relevant against the background of decentralized autonomous organizations (DAOs). These DAOs govern a group of people who share the same interests and goals (Hsieh *et al.*, 2018; Shermin, 2017; Weking *et al.*, 2020) and typically operate without central headquarters or formal organizations. Instead, they rely on a decentralized network of users and consensus- and voting-based governance and decision-making (Narayanan *et al.*, 2016). Especially in the world of blockchains and cryptocurrencies, DAOs have been widely established and described as scalable networks that are open and self-organized (De Filippi & Wright, 2018). Their main promise lies in being a digital alternative to traditional legal entities, making them easier to execute and join and achieving coordination among participants through cryptocurrency-linked economic incentives (De Filippi & Wright, 2018). As such, they allow for the creation of distributed organizations driven by organizational entrepreneurship (Bellavitis *et al.*, 2022). The intersection between entrepreneurship and DAOs presents an important area for entrepreneurship scholars as DAOs allow for the creation of new business models (Bellavitis *et al.*, 2022), the utilization of alternative funding sources (Adhami *et al.*, 2018), or the seeking of new venture legitimacy (Ingram & Morisse, 2016). Thus, DAOs demonstrate a way to perform the function of entrepreneurship. However, our knowledge of social dynamics and changes to DAO members' self-organization and conducting entrepreneurial functions is very limited (Sun *et al.*, 2022; Lustig & Nardi, 2015; Sun *et al.*, 2022; Tana *et al.*, 2019).

Consequently, we aimed to answer the following research question: how and why does members' entrepreneurial behaviour in a blockchain-based DAO change over time? To answer this research question, we studied the decentralized, blockchain-based community surrounding the NANO cryptocurrency (ticker symbol: XNO). Combining qualitative, longitudinal research with data science, we focused on a 16-month period between June 2021 and November 2022. Using semi-structured, qualitative research interviews, we interviewed five DAO members at the beginning and end of this period. Utilizing web scraping and data science techniques, we conducted a sentiment analysis of Nano's online community's central place of exchange. In doing so, we could put into context the statements by the five entrepreneurial DAO members and match them with overall sentiments and trends in this decentralized community.

In the next section, we will conduct the literature review. Then, we will justify our research question and describe the research methodology. Next, we will present the results and findings. Finally, we will close with a discussion and conclusions.

LITERATURE REVIEW

Decentralized autonomous organizations represent a unique organizational model that relies on community consensus, making decisions via voting processes and implementing tasks through automated procedures (Hsieh *et al.*, 2018; Kondova & Barba, 2019). To illustrate, Nano utilizes open representative voting (ORV) as a consensus-driven decision-making mechanism (LeMahieu, 2018), which entails user-selected representative nodes, responsible for voting on transactions, with other nodes independently verifying transaction validity upon achieving a quorum of votes, resulting in swift transaction confirmation. Users possess the flexibility to delegate their voting influence to representatives at their discretion (LeMahieu, 2018).

As shared public ledgers, Blockchains offer traceability and immutability, enabling DAOs to self-govern effectively while reducing communication and transaction expenses (Adams *et al.*, 2017). The blockchain ledger also guarantees the preservation of all DAO activities, fostering transparency and potentially enhancing community trust and confidence (Kypriotaki *et al.*, 2015). Nano is built 'upon parallel blockchains' (Xiao *et al.*, 2020, p. 26), *i.e.* each node runs its own blockchain.

Crucially, a DAO's individual voting members hold extensive power over the organization's direction. For instance, in the case of the first DAO, members voted on hiring or investment decisions (Adams *et al.*, 2017). The DAO members or entrepreneurs within such a DAO perform practical tasks, *e.g.* they create marketing materials, talk to regulators (Ingram & Morisse, 2016), or even create their own projects on top of the cryptocurrency or blockchain (Beck *et al.*, 2018). This fits our understanding of entrepreneurship as a function to be conducted. Therefore, we defined entrepreneurial behaviour as

conducting entrepreneurial functions (Freiling, 2006). After all, as Mises (1996, p. 253) states: 'Economics, when discussing entrepreneurs, focuses on a specific role rather than individuals.' Freiling (2006) notes that one interpretation of entrepreneurship focuses on entrepreneurial actions and the performance of entrepreneurial functions as opposed to the creation of new businesses alone. This perspective fits well our study on individual entrepreneurs and their entrepreneurial behaviour within DAO. However, such decentralized entrepreneurial behaviour can prove surprisingly complicated regarding actors' coordination (Dupont, 2018) and the DAO suffered from 'a worrisome lack of managerial prowess that would typically use forms of rationalizing behaviour' (Dupont, 2018, p. 12). This is because DAO members 'continuously and dynamically self-organize around projects and outcomes' (Kaal, 2020, p. 34) and all this within a decentralized, autonomous setting where the 'actual mode of operation is in need of a more accurate and detailed definition' (Kypriotaki *et al.*, 2015, p. 8). Generally, DAO members 'aim to educate, promote the adoption, and support the growth of cryptocurrency and blockchain ecosystems' (Tana *et al.*, 2019, p. 5) with differing individual skills and approaches. Stemming from this, the first empirical evidence suggests that 'distributed, large digital community with no central structure can operate in much the same way as a large MNC' (Ingram & Morisse, 2016, p. 4090). However, further research is necessary to back up those claims (El Faqir *et al.*, 2020).

Research on social dynamics and motivations within decentralized organizations is notably scarce (Lustig & Nardi, 2015; Sun *et al.*, 2022; Tana *et al.*, 2019; Yetis-Larsson *et al.*, 2015). This knowledge gap is concerning given the significant variance in how participants perceive common currencies in decentralized communities (Lustig & Nardi, 2015). The motivations and decisions of individual actors are especially critical, considering that DAOs emphasize decentralization by distributing decision-making power among members instead of a central authority (El Faqir *et al.*, 2020).

While current empirical research focuses primarily on technological aspects (Weking *et al.*, 2020), scholars have devoted limited attention to the study of entrepreneurship within these emerging decentralized organizations (Kher *et al.*, 2021). Given that the first DAO was introduced only in 2016 (Liu *et al.*, 2020), governance and work coordination within these organizations remain largely unexplored (Chohan, 2017). The disintermediating potential of blockchain-based organizations represents a promising avenue for future research, particularly when gathering insights from practitioners (Adams *et al.*, 2017).

It is crucial to understand how blockchain-based DAOs influence the orchestration of entrepreneurial functions among their members, as the decisions of all members govern these organizations (Kondova & Barba, 2019). Moreover, the element of time becomes increasingly relevant. Longitudinal research is essential to comprehending the roles and trajectories of DAO members over time, considering the rapid evolution of blockchain technology, community ideology, and market volatility within the cryptocurrency realm (Chalmers *et al.,* 2021). Existing evidence indicates that behavioural aspects of cryptocurrencies, such as herding effects, exhibit significant fluctuations over time (Bouri *et al.*, 2019). Previous DAOs have undergone dramatic changes over time (DuPont, 2018). Therefore, accounting for time is crucial in DAO and blockchain research, especially within the context of entrepreneurship, which involves a series of evolving events (McMullen & Dimov, 2013).

Moreover, it remains unclear how non-financial incentives are aligned within DAO or how any further strategic and operational development of a particular DAO is incentivized (Beck *et al.*, 2018). This remains an important question as a DAO's decentralized dynamics can lead to it changing significantly over time, such as starting as an instrument for members' collective investment 'and then morph into a community, a grant organization, a sponsor of creative work, an incubator of entrepreneurial ventures, a trading platform, or anything else' (Slavin & Werbach, 2022, p. 13). This becomes even more relevant as scholars found that members and investors interested in decentralized structures possess different motivations (Fisch *et al.*, 2021; Tana *et al.*, 2019). As cryptocurrencies can be prone to herding behaviour (Bouri *et al.,* 2019) or be dependent on stakeholders' happiness and sentiment (Naeem *et al.*, 2021), DAO members' feelings and attitudes and their effect on the DAO still constitute a research gap.

Based on the discussion above, we formulated two research propositions that guided our data collection and analysis. Based on earlier literature contributions highlighting the variance of DAO members within communities, we propose:

Proposition* 1:*** The DAO members motivated by cryptocurrency's technological aspects will display a different entrepreneurial behaviour over time than the members mainly motivated by financial aspects.

Based on the discussion surrounding different motivations and sentiments among DAO members, we propose:

Proposition* 2:*** The DAO members' perception of the health and desired direction of the DAO influences these individuals' entrepreneurial behaviour.

RESEARCH METHODOLOGY

To gain a comprehensive understanding of this relatively unexplored topic (Tana *et al*., 2019; Yetis-Larsson *et al*., 2015; Sun *et al*., 2022), we employed a research methodology that involved studying the topic in real-life contexts and using multiple evidence sources (Yin, 2013). Due to the limited prior research on DAOs, we opted for a qualitative approach to collect information from informants about their entrepreneurial experiences (Maxwell, 2005). We chose an exploratory and inductive approach to gain a deep understanding of this phenomenon since existing research lacked a clear basis for forming hypotheses (El Faqir *et al*., 2020; Gioia *et al*., 2013; Bortz & Döring, 2006). We aimed to uncover the subjective interpretations of the informants' organizational settings and follow an interpretive research paradigm, considering informants as creators of their social reality (Maxwell, 2005; Burrell & Morgan, 1979). We employed qualitative methods as they are better at uncovering subjective interpretations than quantitative methods (Denzin & Lincoln, 2005).

For qualitative sampling, we contacted entrepreneurially active Nano community members via direct Reddit messages and purposively selected them based on theoretical reasons (Miles *et al*., 2014). Five individuals responded positively and we interviewed them. Table 1 outlines the key characteristics of this research. The interviews, conducted in June 2021 and November 2022, were semi-structured and lasted an average of 31 minutes, aligning with typical qualitative interview durations (DiCicco-Bloom & Crabtree, 2006). Due to logistical constraints, all interviews, we held all interviews via Zoom, audio-recorded them with consent, and transcribed them verbatim, which resulted in 60 single-spaced transcript pages. This approach allowed for longitudinal, qualitative data collection (Hermanowicz, 2013). In the data analysis process, we followed the steps outlined by Miles *et al*. (2014). Initially, we assigned first-level codes using MaxQDA, reflecting interviewees' statements. We then grouped these codes into higher-level categories after referencing prior literature (Gioia *et al*., 2013).

Finally, data interpretation involved identifying patterns and relationships among the higher-level categories to address the research question (Creswell, 2013). This process led to the creation of various tables summarizing the qualitative data (Miles *et al*., 2014). Importantly, the small-sample and purposive approach limit the generalizability of our findings (Bortz & Döring, 2006). However, in case studies, generalization is more analytic than statistical (Yin, 2013). Further research with larger and more probabilistic samples is needed for statistical generalizability and it can utilize our research propositions to guide future studies (Bortz & Döring, 2006). This iterative research approach can enhance our understanding of entrepreneurial behaviour in DAOs (Maxwell, 2005).

Table 1. Main characteristics of interview participants

Pseudonym	Role in Nano DAO	First interview	Second interview
CREATOR (C)	Built start-up based on Nano.	June 2021	November 2022
MARKETER (M)	Created information materials on Nano.	June 2021	November 2022
DEVELOPER (D)	Engaged in further developing of Nano.	June 2021	November 2022
TECHNOLOGIST (T)	Built web app using Nano.	June 2021	November 2022
INFORMER (I)	Spread Nano information on Twitter.	June 2021	November 2022

Source: own study.

To complement our semi-structured qualitative interviews, which revealed herding behaviour and sentiment dependencies within DAO (Bouri *et al*., 2019; Naeem *et al*., 2021), we incorporated data

science-driven quantitative sentiment analysis. This approach allowed us to triangulate and expand upon the insights gained from qualitative interviews.

Sentiment analysis is grounded in the concept that individuals' emotional evaluations of situations provide valuable insights into their feelings and potential reactions (Bortz & Döring, 2006). While scholars have traditionally applied lexicon-based sentiment analysis in the context of cryptocurrencies, often for price prediction purposes (Anamika *et al.*, 2021; Ayvaz & Shiha, 2018; Sasmaz & Tek, 2021), we focused on analysing Nano community members' sentiment over a 16-month period and its impact on their engagement in entrepreneurial activities.

We collected data from Nano's two primary online communities on Reddit.com, namely r/nanotrade, which emphasizes price discussions and attracts users interested in Nano's financial aspects, and r/nanocurrency, where technological discussions and the broader direction of Nano are central. Using an R web scraping script, we gathered post titles from these communities over the 16-month period, resulting in a dataset of 977 rows from r/nanotrade and 1.147 from r/nanocurrency. Table 2 presents a sample of the scraped data.

Table 2. Example data of subreddit scraping

Title	Author	CreatedDate
Volume on coinmarketcap has gone bonkers	sometimesimakeshitup	2022-11-26T19:24:50.000Z
Just deposit your Nano here, its 'safu'	melonmeta	2022-11-26T18:02:25.000Z
It's pumping!	Majestic_Magician243	2022-11-23T19:17:40.000Z
Remove your Nano from exchanges	marshall1905	2022-11-25T07:21:12.000Z

Source: own elaboration based on web scraping from Reddit.com.

We performed cleansing to remove hashtags, emojis, mentions, URLs, punctuations or extra white spaces. We completely removed titles consisting of simply URLs. We reduced words to their root form and converted them to lowercase. We used stop words such as 'dailygeneraldiscussion' next to the standard English stopwords dictionary. After cleansing, 796 and 965 rows remained, respectively. Next to a general emotion lexicon (Mohammad & Turney, 2013), we used a cryptocurrency-focused sentiment lexicon (Sasmaz & Tek, 2021) as a starting position for data labelling. Moreover, we added. some Nano-specific terms such as 'faucet' for the purpose of data labelling. Table 3 outlines an example of our data labeling. After data scraping and cleansing, we used the resulting term-document matrix to perform an R sentiment analysis based on the NRC package returning the data frame with each row classified as an emotion. We also measured vector scores (see Table 5 for a vector summary of both Nano subreddit communities). They served as the basis for the analysis of sentiment over time (Figure 1).

Table 3. Example of data labelling

Positive	Negative
Rise of Nano this week alone	I am so done with Nano
Nano is the future	Why it keeps dropping

Source: own elaboration based on web scraping from Reddit.com.

As DAO stakeholders' have been found to be sensitive to price movements of the underlying cryptocurrencies (Naeem *et al.*, 2021), we scraped Nano's price development using public sources and plotted alongside the number of comments in both r/nanotrade and r/nanocurrency. In doing so, we could track and match overall activity levels with informants' statements.

RESULTS AND DISCUSSION

Results

All interviewees praised the Nano community's vitality in 2021 and prior. They emphasized that during this period, Nano experienced frequent code sharing, active discussions to improve Nano, and a steady influx of new members in Reddit communities. According to CREATOR, Nano exemplified a 'transac-

tional and innovative' ethos, initially being entirely community-driven. This era followed Nano's price surge to 11 USD in April 2021, maintaining a range of 5-9 USD throughout much of autumn 2021, which was a notable increase from its previous range of 1-2 USD from 2018 to 2020. The interviewees actively contributed by responding to inquiries, evaluating concepts, crafting marketing materials, and developing Nano-based applications to showcase its technological potential. Their enthusiasm stemmed from Nano's minimal or zero transaction fees. Table 4 highlights interviewees' substantial involvement within Nano's DAO in 2021, reflecting a thriving community.

Figures 6 and 7 illustrate the significant activity in the two Nano forums leading up to the initial research interviews, aligning with Nano's rising market prices. Both segments of the Nano community predominantly conveyed positive sentiment, occasionally surpassing negative sentiment, particularly in the technology-focused r/nanocurrency. Figures 2 and 3 underscore the primary themes in these communities, with technical discussions prominent in r/nanocurrency and financial aspects in r/nanotrade. Figures 4 and 5 indicate that the majority of emotions expressed in both communities were positive, including anticipation, joy, and trust.

Table 4. Summary of qualitative interviews

Feature / Member	CREATOR	MARKETER	DEVELOPER	TECHOLOG.	INFORMER
Level of activity 2021	Very high (built start-up)	Very high (performed marketing)	High (uses Nano tech)	High (uses Nano tech)	Very high (performed Twitter marketing)
Level of activity 2022	Very high (continues with start-up)	Lower (no more marketing, fewer community visits)	High (uses Nano tech)	Low (abandoned project)	High (more active behind curtains)
Overall sentiment 2021	Very positive (Nano met personal criteria)	Very positive (believes in decentralized Nano with limited supply)	Positive (Nano as means to a technological end)	Positive (initially just investment, then appreciation of community)	Very positive (believed in Nano from the outset)
Overall sentiment 2022	Positive (still believes in Nano, cites tough environment)	Moderate (shift towards inner-circle of Nano users)	Positive (Nano still means to a technological end)	Indifferent (no longer active in the community)	Very positive (believed in Nano from the outset)
Main tasks 2021	Being a delegate for voting, figure of trust, community figurehead	Spreading information, writing marketing materials, community Q&A	Developing a payment product based on Nano	Built and showcased Nano web app	Spreading information, organizing community events
Main tasks 2022	Being a delegate for voting, figure of trust, community figurehead	Answering community questions here and then	Still operating the product as showcase	No longer active	Spreading information, organizing community events
Definition of success in 2021	Size of Nano community (subreddit members), the evolvement of Nano as a payment option	Size of Nano community (subreddit members), businesses that adopted Nano	Usable Nano technology and protocol (*e.g.* eliminating spam attacks), independent of number of users	Adoption of Nano as fast payment option, price	Wide, real-life adoption of Nano
Perception of success achievement in 2022	Split in community, users interested in price left, the challenging business environment for start-ups as crypto sentiment deteriorated	Market size for Nano decreased, fewer users, and shift towards inner circle instead of outreach via social media	No change, work on Nano tech going on	Crypto and Nano downturn erased momentum	No change, work on Nano technology going on

Source: own elaboration based on research interviews.

Table 5. Vector summary scores for the two Nano subreddits overall

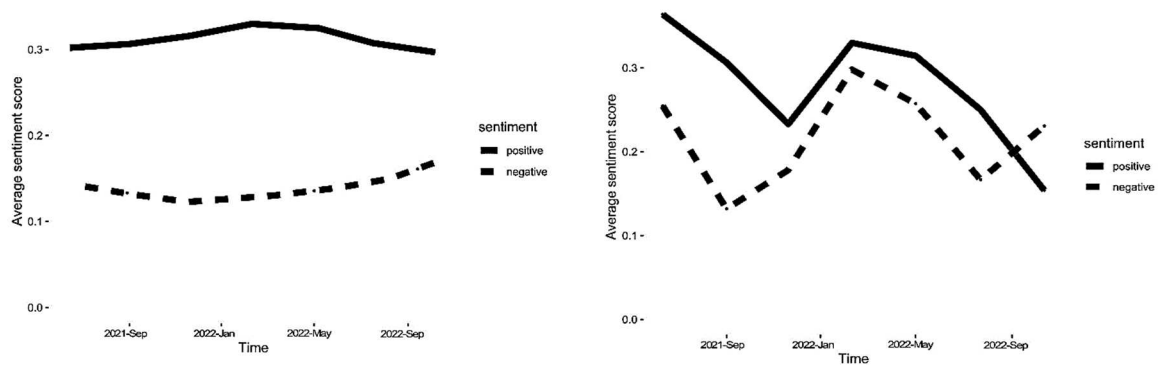| Community	Min.	1st Q.	Median	Mean	3rd Q.	Max.
r/nanocurrency	-2.100	-0.600	0.250	0.638	1.200	3.550
r/nanotrade	-2.350	-0.600	-0.600	-0.4055	0.100	2.800

Source: own study.

Figure 1. Sentiment over time: r/nanocurrency (left), r/nanotrade (right)
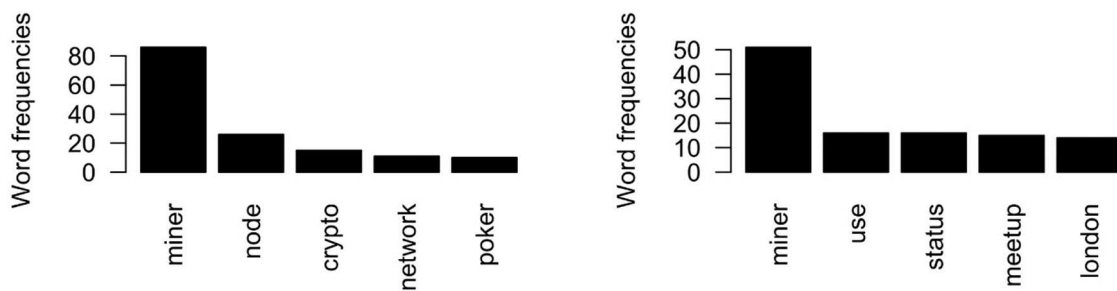Source: own elaboration based on web scraping from Reddit.com.

**Figure 2. r/nanocurrency – most frequent words in data set after cleansing: June 2021
to February 2022 (left), March to November 2022 (right)**
Source: own elaboration based on web scraping from Reddit.com.
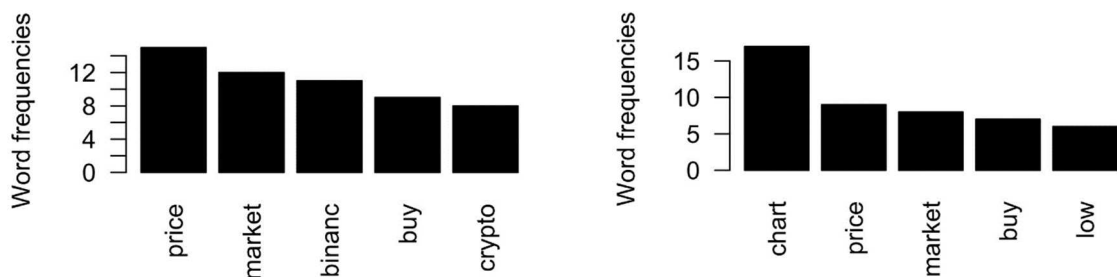
**Figure 3. r/nanotrade – most frequent words in the data set after cleansing: June 2021
to February 2022 (left), March to November 2022 (right)**
Source: own elaboration based on web scraping from Reddit.com.
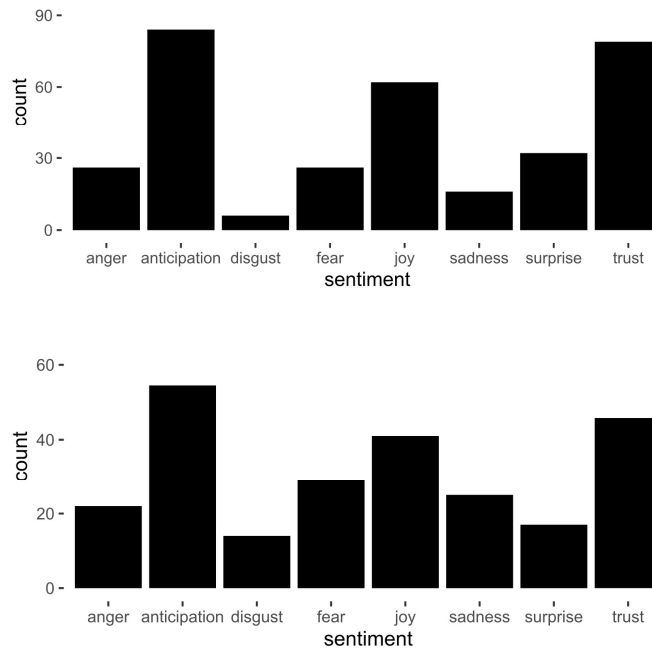
**Figure 4. r/nanocurrency – the proportion of words associated with each emotion in the data set:
June 2021 to February 2022 (top), March to November 2022 (bottom)**
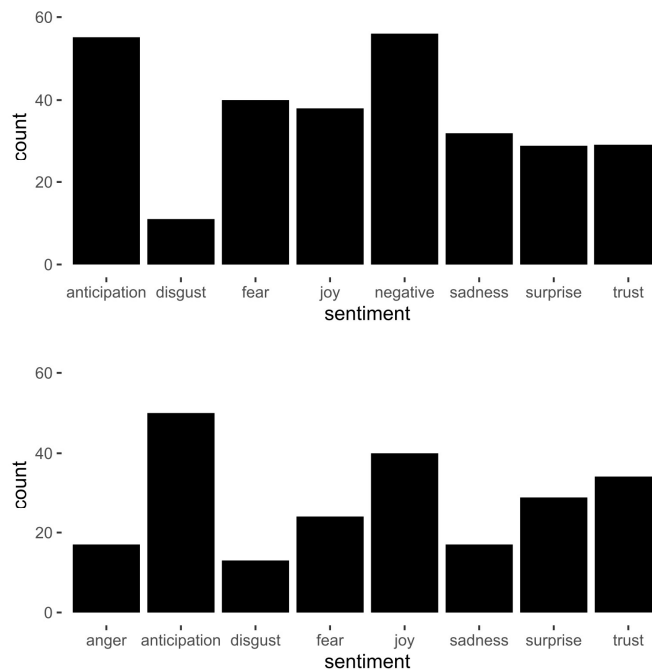Source: own elaboration based on web scraping from Reddit.com.

**Figure 5. r/nanotrade – the proportion of words associated with each emotion in the data set:
June June 2021 to February 2022 (top), March to November 2022 (bottom)**
Source: own elaboration based on web scraping from Reddit.com.

In 2022, significant changes occurred in the crypto landscape, with prices plummeting, including Nano, which dropped below 1 USD before stabilizing around 1-2 USD. This downturn affected the overall crypto sentiment. CREATOR described the situation as fluctuating, with mainly Nano enthusiasts remaining active. MARKETER noted reduced engagement on Reddit due to basic topics saturation, and DEVELOPER likened the environment to a 'ghost town.' INFORMER emphasized the resilience of Nano's dedicated supporters.

From an entrepreneurial standpoint, the price decline impacted perceptions and made it challenging to engage business leaders in crypto investments. CREATOR shifted conversations towards customer engagement to navigate this. Outreach to businesses by Nano members declined in 2022, potentially due to crypto's reduced popularity and market size. TECHNOLOGIST observed fewer news and projects compared to Nano's past, leading to motivation challenges for DEVELOPER. The overall crypto downturn discouraged people from collaboration.

Figure 1 shows a narrowing gap between positive and negative sentiment in r/nanocurrency in mid-2022. In r/nanotrade, the negative curve surpassed the positive one. Both Nano Reddit segments maintained technology and finance-related discussions. An upcoming member meetup in London indicated positive developments. In r/nanotrade, negative emotions like sadness, fear, and disgust scored higher than in 2021, while r/nanocurrency also saw an increase in negative sentiment, including fear, sadness, and disgust. Figures 6 and 7 demonstrate a noticeable decrease in comments on Nano-related topics in spring 2022, with minimal activity during the summer months.

TECHNOLOGIST theorized that Nano's lack of new features like NFTs and decentralized finance contributed to member attrition. CREATOR, MARKETER, and DEVELOPER found that their self-defined success indicators for Nano's community were not met by November 2022, leading to downsizing or abandonment of entrepreneurial activities within the Nano DAO for MARKETER and DEVELOPER. CREATOR faced a more challenging business environment for their Nano-based startup. INFORMER and TECHNOLOGIST were content with Nano enthusiasts' continued work on Nano's code and technology. DEVELOPER highlighted the absence of substitutes for actively engaged members like MARKETER, with no news or project developments.
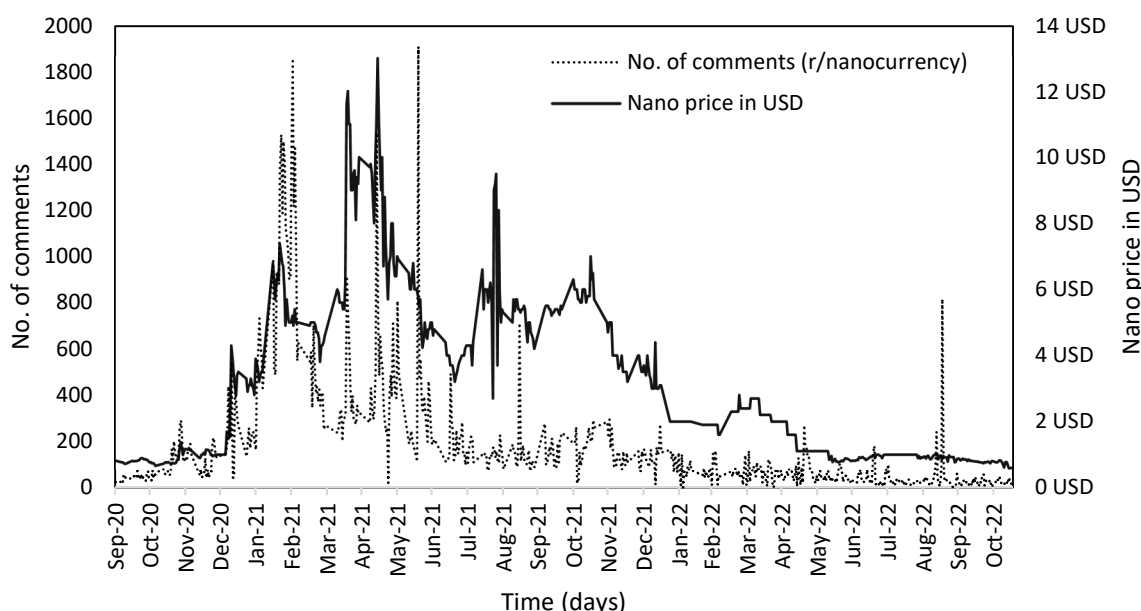

Figure 6. Number of comments in r/nanocurrency and Nano's price movements over time
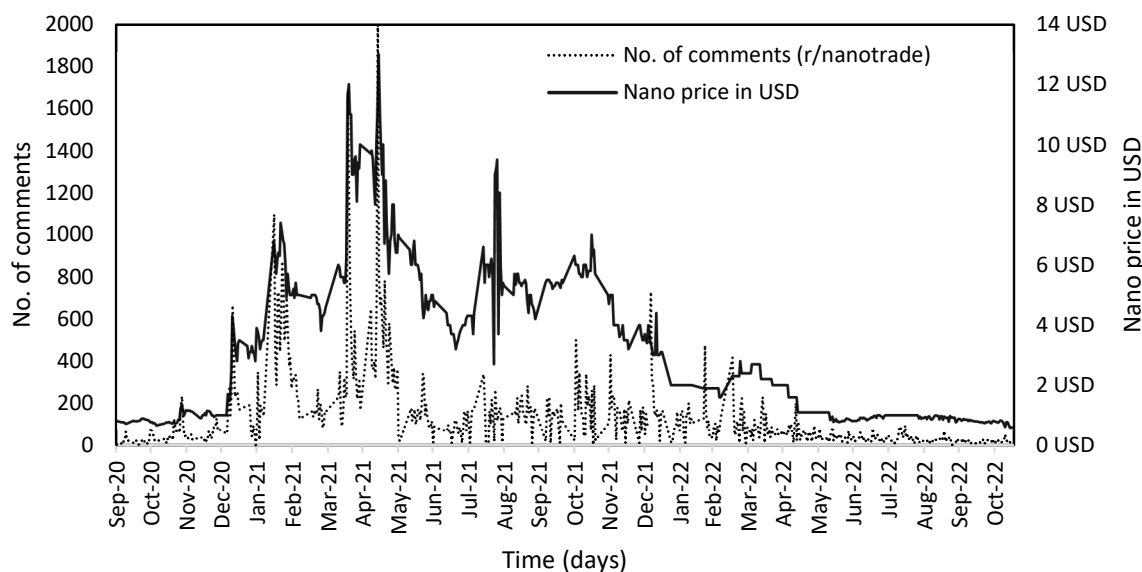Source: own elaboration based on web scraping from Reddit.com.

Figure 7. Number of comments in r/nanotrade and Nano's price movements over time
Source: own elaboration based on web scraping from Reddit.com.

Proposition Check

Based on these findings, we can now revisit our initial research propositions. According to our first proposition, DAO' members motivated by technological aspects of the cryptocurrency will feature a different entrepreneurial behaviour over time than those mainly motivated by financial aspects. We confirm this proposition. Both our sentiment analysis in r/nanocurrency and r/nanotrade as well as interview responses from participants show diverging entrepreneurial behaviour among those two groups of DAO members.

> **Proposition 1 (confirmed)**: The DAO members motivated by cryptocurrency's technological aspects will display a different entrepreneurial behaviour over time than the members mainly motivated by financial aspects.

As to our second proposition, we expected DAO members' perception of the health and desired direction of the DAO to influence their entrepreneurial behaviour. Looking at our results, we modified and substantiated this proposition as follows:

> **Proposition 2 (modified)**: The DAO members' perception of the health and desired direction of the DAO influences these individuals' entrepreneurial behaviour.

Furthermore, and in line with our iterative approach to research, we can formulate a third research proposition after data analysis:

> **Proposition 3 (new)**: Developments in the broader cryptocurrency market influence DAO members' entrepreneurial behaviour.

Discussion

In response to recommendations for longitudinal research on DAO and member trajectories (Lustig & Nardi, 2015; Sun *et al.,* 2022; Tana *et al.,* 2019; Yetis-Larsson *et al.,* 2015), we conducted a 16-month study of the Nano DAO. The findings revealed a dynamic landscape of entrepreneurship within the DAO.

Initially, members displayed high motivation and fascination with various aspects of the Nano DAO in mid-2021. However, these sentiments waned over the subsequent twelve months, leading to the departure of many Nano DAO members. This phenomenon aligns with prior observations of herding behaviour in cryptocurrency communities (Bouri *et al.*, 2019; Naeem *et al.*, 2021). Notably, our study

Table 6. Selected quotes from interviews: 2021 and 2022

By	2021	2022
C	I really have certain criteria that I want to use so that I can innovate in this world … so I scoured the world of cryptocurrency to look for some payment platform that fit those criteria. … It [Nano] had that 'want to use this to transact and do cool things with that' mindset.	My perception is that [Nano technology] has evolved at a pace that is expected. … so once the novelty of the technology reaches a certain saturation, the number of interesting things to talk about in that space becomes less and less. Now, the focus turned to the entrepreneurs to use that technology to then create even more interesting business applications.
C	That was highly fascinating to me because my whole passion for the digital currency ecosystem was the ability to transact with minimal fees … and so I saw a lot of business opportunities there, a lot of room for innovation and new innovative business models that didn't exist before, because you always had a payment fee.	It ebbs and flows. … The price drop matters for perception. The business leaders I speak to talk about crypto as an investment and do not want to do it when prices are down. Which is why we try to steer the conversation away from crypto. Or we say we can use stablecoins. So the price erosion makes it more challenging for me as an entrepreneur.
M	I am quite active on the public forums. … Sort of helping them try it out or answering any questions. On the other hand, for example, writing articles about it, that can then be shared. … Essentially spreading knowledge and just helping people in the community. Also sort of bringing people together because I have been around the community for quite a while now.	Reddit declined a lot since we last spoke, *e.g.* the daily discussion thread changed to a weekly discussion thread as there is not much to talk about. … The deeper tech level of discussion has stayed solid. Outreach has decreased, maybe because crypto is less popular.
M	And in that channel, for example, [a user] came up with a poll saying, which is the current biggest challenge for Nano to achieve our objectives, *et cetera*. And then people can vote.	For example, I go less to the subreddit myself. I write fewer articles because I think most basics are covered. But generally, I am just less active because there is less to reply to.
T	Nano is a perfect fit for my project because it showcases the speed. If you were to use any other cryptocurrency that would take a lot longer than Nano. And they have fees.	Yes, still running the [*project*]. A couple of users use it.
T	I cannot say it was my intention to contribute to the community. Nano just served as an excellent avenue to create this project. I'm somewhat of a hobbyist with the electronics, and I thought it would be very fun to create a project like this. Nano just happened to be the perfect solution for this project. I am happy now, too, that the project may have introduced some people to Nano.	It is still a blend of all the groups but it is trending more towards technology now that the price is not so exciting. I see more discussions about technology and projects that leverage the fundamentals of the tech rather than discussions of price and speculation. For example, there are two subreddits, Nano price [nanotrade] and Nano tech [nanocurrency] and in the past, the price one was more popular and now it has become the other round.
D	Initially, it was only an investment. … And I learned about which cryptocurrency project I should invest, and Nano is one of the projects that I see has a lot of people in the community. And for me, that is a good sign. Right. So I dug deeper and deeper.	[*Web app based on Nano*] is still online, I am not maintaining it though. A guy telegrammed me and said that he liked the project and could bring people on the website. Nothing came out of it though. I am not active in the community anymore; I got a new job that I am learning now.
D	I see every day that people keep adding new code and make Nano better. And that part is awesome. … To create a system and tap into the network without asking anyone. And that gives a lot of possibility to a person. So yeah, basically it just opened a whole new world.	Nowadays, it feels like a ghost town. Are we still active? I just checked and there seems to be no news or ideas, no projects.
I	There are definitely the gold diggers that are like the investors, the traders …., But, I think, as far as the people pushing the code and further adoption goes I think that's most probably those people who have that shared vision of the centralized cash, because they're the ones that stick around, even if the price goes to zero, right.	The price drop certainly flushed out some people who were more interested in the money side of things. But the people dedicated to bringing Nano forward are still there. Still working on the technology, still improving it.

Source: own study.

extended these findings by indicating that external circumstances can impact entrepreneurial behaviour within a DAO, including the execution of entrepreneurial tasks and functions.

The broader cryptocurrency market's downturn and competition from cryptocurrencies with novel features emerged as key factors prompting individuals to exit the Nano DAO. This exodus further discouraged previously active entrepreneurial members. Activities such as marketing, community engagement, content creation, outreach to potential clients, and app development to showcase Nano's technology were among the entrepreneurial tasks that saw reduced participation from DAO members in 2022. Moreover, our study extends findings regarding DAO members' shared motivations and goals (Hsieh *et al.*, 2018; Shermin, 2017; Weking *et al.*, 2020). In the case of Nano, those more interested in the actual technology were less affected by the declining levels of community activity than those who valued a sizable and growing membership. On the contrary, the technology-focused members indicated to continue their entrepreneurial tasks, mainly working on Nano's code. Still, it appears that some sort of critical mass of community members that populate the online forums, answer questions, or contribute ideas is beneficial to the motivation of a wider set of entrepreneurially active DAO members. This represents an intriguing finding as it suggests that a DAO's overall entrepreneurial behaviour is more active when both technologically oriented as well as market-oriented members are satisfied with internal and external environments. Thus, while our evidence confirms Lustig and Nardi's findings (2015) concerning the variance among DAO members, we extended previous knowledge. Our research also adds to findings concerning the dynamic self-organization of DAO members around projects and tasks (Kaal, 2020). We observed that self-organization can result in entrepreneurial tasks not being completed or being done less effectively.

CONCLUSIONS

How and why does the execution of entrepreneurial tasks change within a blockchain-based DAO? Our investigation revealed that external factors, particularly the overall health of the cryptocurrency market can significantly influence the motivation and commitment of DAO members. During a substantial cryptocurrency downturn in much of 2022, some active Nano DAO members engaged less or scaled down their entrepreneurial activities. This shift correlated with a sharp decline in community engagement, primarily driven by price-focused members exiting the community or migrating to Nano's competitors. The dwindling community size led to reduced activity and motivation among previously enthusiastic and entrepreneurial members. While our study did not explore the self-reinforcing dynamics in-depth, it does suggest the need for further research on how a decentralized autonomous organization can break free from such negative, self-reinforcing cycles.

Our study offers a crucial insight for DAO members by emphasizing the importance of bridging the gap between technology-oriented and market-oriented individuals within the organization. These two groups exhibit distinct motivations and behaviours, however, our findings underscore the tangible benefits of fostering participation from both segments within the DAO. Addressing these differing motivations and aligning group-level goals can serve as a practical recommendation for DAO members seeking to sustain or enhance entrepreneurial activity within the community.

While our study benefits from a unique and comprehensive dataset from the Nano community, it comes with several limitations due to its exploratory nature. Firstly, empirical generalization is hardly possible as cryptocurrency-based DAOs can vary considerably, especially in terms of technology. Employing replication logic, following Eisenhardt and Graebner (2007), could aid in constructing more robust theories, paving the way for future research to build upon our findings. Secondly, our study relied on interviews with only five DAO members, leaving room for potential biases in their responses. While we employed some general triangulation level, particularly in comparing interviews with the outcomes of our sentiment analysis, inherent limitations remain. Lastly, despite its longitudinal design, our study encompassed a relatively narrow timeframe of 16 months, limiting its capacity to make predictions about the DAO's future. Consequently, we recommend future research in the intersection of entrepreneurship and DAOs to expand the sample size of DAO entrepreneurs and extend the research period for a more comprehensive understanding.

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Conflict of Interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.