Research on Token Incentive Mechanism of Open Source Project - Take Block chain Project as an Example

To cite this article: Sichen Liu 2019 *IOP Conf. Ser.: Earth Environ. Sci.* **252** 022029

Research on Token Incentive Mechanism of Open Source Project - Take Block chain Project as an Example

Sichen Liu*

School of Management, Shanghai University, Shanghai, China

*Corresponding author e-mail: lsc199409@163.com

Abstract. People will respond to incentives, so how to use reasonable and effective incentives to continuously encourage open source project participants, inspire their enthusiasm and development potential, is particularly important. The block chain open source community typically consists of project leaders, developers, users, and investors. The original intention of block chain tokens is to stimulate the ecosystem, and the incentive mechanism for tokens is effective in providing funds and generating incentives for project development. But the token incentive mechanism also has limitations. After the upsurge of block chain project creation and investment, it is necessary for project participants to raise their understanding of tokens, promote the forthcoming block chain open source projects to design tokens distribution scheme more carefully, trigger industry self-regulation, ensure fair distribution and practical application, and return to the original intention of issuing block chain tokens.

1. Introduction

The open source movement has emerged since the 1990s. With the rapid development of the Internet, the open source movement has not only been accepted for 20 years, but has been widely applied. Quickly meeting the current growing needs has become an inherent potential for the development of open source projects. The open source project has great openness in the development process. Its main form is the virtual community of the Internet. The results of the project are usually highly shared, so many volunteers have been recruited and the project has achieved high development efficiency and a lot of results. At present, open source projects have been widely applied to the software industry. Some open source software projects have developed software that is comparable to commercial software, and even become a replacement for commercial software, such as Linux Kernel, Apache Web Server and so on. Since the birth of Bitcoin in 2009, a new open source software project, the block chain open source project, has emerged. In less than a decade, block chain projects have grown from scratch, especially in the last two years to reach the climax of project creation. At the same time, the variety and scale of various tokens that accompany the block chain project have also expanded rapidly.

2. A Summary of research on incentive mechanism of open source projects

The open source project is essentially a production process of knowledge iterative innovation, that is, the sharing and integration of the knowledge that the developer has mastered, so the uncertainty of the development result is very high. In other words, all participants of open source projects, especially developers, need to bear various development costs and high risks. The intellectual property law stipulates that developers can have a certain time monopoly on their research and development results, which is to some extent incentive the developer's innovation activities. But unlike traditional projects,

the results are completely publicly shared in open source projects. This model seems to be insufficient for developers and is not conducive to the development of the project, but this is not the case. Many open source projects have been successful, which has brought great challenges to the principles and theories of classical economics, and has attracted the attention of many scholars.

From an economic point of view, everyone is an economic person, and people cannot continue to make unrewarded contributions without any profit. The open source project can only continue to mobilize the enthusiasm and creativity of the people involved in the project, continuously enhance the vitality of the open source organization, improve the efficiency and efficiency of development, and the project can continue to develop. People respond to incentives, so how to use reasonable and effective incentives to motivate open source project participants to motivate their participation and development potential is particularly important. Existing research mainly explains the paradox of incentives and efficiency in open source projects by looking for different incentives. Table 1 below summarizes some domestic and foreign scholars' research on the motivation of people to participate in traditional open source projects. At present, no scholars have conducted a comprehensive study on the token incentive mechanism unique to the block chain project.

Table 1. Summary of influencing factors of traditional open source project participation.

Scholar	Research content	Research method	Influencing factor
Hars & Ou (2002)	Developers' motivation to participate in open source software projects	Online survey	Internal factors (internal motivation, altruism, community identity), external returns (future returns, personal needs)
Hertel et al. (2003)	Developers' motivation to participate in open source projects, research and development for Linux kernel developers	Online survey	Internal motivation (programming fun, challenge), social competition, reputation
Lakhani & Wolf (2005)	Developer motivation and development efforts in free/open source software projects	Online survey	Internal motivation (based on fun, community-based), external motivation (using software, career advancement, technological advancement)
Bitzer et al. (2007)	Internal motivation for open source software development	Theoretical research	The needs of specific software solutions, the joy of programming, the gift of culture
Jiajia Tan (2008)	Research on the Influencing Factors of open source software developers participating in open source community	Online survey, empirical research	Internal motivation (fun, community identity), external motivation (use needs, knowledge exchange, career advancement)
Yu Wang (2013)	Analysis of multiple incentive mechanisms of open source innovation	Theoretical research	Outcome incentives (customized needs, business interests), participatory incentives (innovative fun, altruism and reciprocity, learning effects, community affiliation and peer recognition, signal benefits for career advancement)
Xiaohong Chen et al. (2016)	The motivation of open source software developers to influence the sharing of open source projects by affecting knowledge sharing	Online survey	Intrinsic motivation (hobbies and interests, skill learning, dedication), extrinsic motivation (professional promotion, prestige honor)

Through the above literature analysis, it is not difficult to find that the incentives of traditional open source projects are generally divided into internal motivation (hobbies and fun, learning needs, dedication, community belongings, etc.) and external motivation (prestige honor and peer recognition, career promotion, use needs) , knowledge exchange, etc.), and external motivation generally does not include direct economic returns. Blockchain open source projects are often accompanied by the emergence of tokens, which can bring direct economic benefits to the holder by circulation in the trading market.

A successful block chain open source project requires not only developers but also the continuous contribution of other project participants. In the block chain project, the motivation for the continuous contribution of all parties involved is related to its unique token incentive mechanism. . The research in this paper helps to enrich the literature on incentives and innovations in open source projects, especially the impact of tokens on the motivation of participants in block chain open source projects. Because the token incentive mechanism is based on block chain projects, this article first analyzes the composition of the open source community of block chain projects in the next section, introduces the token generation mechanism of different projects, and uses NEO as an example to analyze how to use tokens. Incentives. Finally, the advantages and disadvantages of the token incentive mechanism are discussed in the conclusion, in order to find new solutions for the incentive mechanism of open source projects.

3. Token incentive mechanism for block chain projects

3.1. Blockchain open source community composition

The development organization of open source projects is the open source community. The roles in the traditional open source community can be roughly divided into three levels: project leader, developer, and user (Ye and Kishiida, 2003; Barcellini et al., 2009; Sha Sha, 2014. The block chain open source community consists of project leaders in addition to the project leader, developers, users, and investors, and the four roles are not independent of each other, that is, a person may have multiple identities in the block chain community at the same time.

In the block chain open source community, project leaders are generally the initiators of the project, responsible for the project's vision and overall direction of development. Developers can be divided into core developers, active developers, and peripheral developers according to the degree of contributing code. The core developers are project leaders and key developers who have been involved in the project for a long time and have made significant contributions to the development and evolution of the project. In some second-generation open source projects, the core developers form the board and replace Project leaders guide the development of the project. Both co-developers and peripheral developers have the dual roles of developers and users. The difference is that co-developers regularly contribute new code to modify the source code, while peripheral developers contribute occasionally and their participation time is short. And sporadic. Users can be divided into active users and passive users according to the degree of their participation in the project. Active users will report software vulnerabilities, propose functional requirements and software development directions. Passive users only use software and do not participate in community discussions. Investors are the people involved in the various rounds of financing of the project. They are the providers of project funds, and they may also be project leaders, developers and users.

According to the report released by Deloitte in November 2017, “Evolution of Block chain Technology: Insights from the GitHub Platform”, there are 86,034 projects on GitHub about block chain, of which more than 50,000 are created on GitHub in 2016 and 2017. Blockchain related projects. However, it is worth noting that only 8% of the nearly 90,000 projects were maintained, and the average life expectancy of the project was only 1.22 years. Projects developed and maintained by the organization are the mainstay of block chain technology, such as the Bitcoin project, which attracts more followers and contributors to maintain long-term maintenance. The success of open source community operations is related to the success or failure of the project. How to better encourage members of the community to participate in project innovation voluntarily, how to attract potential users outside the

community to join the community to maintain the sustainable development of open source community projects is the biggest problem facing.

3.2. Different mechanisms for generating tokens

The incentive factors of traditional open source projects generally do not include direct economic returns. In the open source project of block chain, because of the existence of tokens, participants can get huge economic returns through a way similar to Seignior age tax, so tokens can have incentive effect on all parties in the ecosystem of block chain project, that is, token incentive mechanism (Andrea Canidio, 2018).

Bitcoin (BTC) is the world's first and most successful block chain open source project to date. In November 2008, Satoshi Takemoto (a pseudonym) first proposed the concept of Bitcoin. In the end of 2010, Takemoto left the project. Since then, many developers have worked together on the Bitcoin project, and the Bitcoin community has grown rapidly. The cryptocurrency circulating in the Bitcoin network is Bitcoin, and the new Bitcoin is generated by “mining” and awarded to miners who created this new block as compensation for the resources they consume to create new blocks. The upper limit of Bitcoin is set at 21 million, and the Bitcoin network can be imagined as a system of equations with only 21 million special solutions. Each equation generated by a complex algorithm is a bitcoin. A system of equations can have an infinite number of solutions. A special solution is one of the solutions. It can solve the equations and is unique. The process of “mining” is to obtain each of the equations through a series of calculation processes. Special solution. At the same time, the upper limit time for generating all bitcoins is also set to a fixed value, and bitcoin is generated at a predictable step-down rate. Ten million bitcoins were unearthed in the first four years, releasing 50 bitcoins to the network every 10 minutes. This value is gradually halved every four years, and all bitcoins will be manufactured by 2140. Since then, the operation of the Bitcoin network still requires the miners to continue to work, but will not generate new bitcoins, and can only support the miners' work by charging transaction fees for each transaction.

NEO, formerly known as Small Ant, is a non-profit, community-based block chain project that uses block chain technology and digital identity to digitize assets and use intelligent contracts to automate the management of digital assets to achieve a distribution of “smart economy”. Network. NEO is an early public chain project in China. It was officially established in 2014 and was open sourced on Github in June 2015. According to the data of the cryptocurrency data analysis website coinmarketcap.com (CMK for short), the current global market capitalization ranks 11th, and it is also the cryptocurrency with the highest total market capitalization in China. Different from Bitcoin and ingeniously, NEO has built two original tokens on the economic model - NEO (Nemo), and NeoGas (GAS). The total amount of NEO and GAS is 100 million. NEO is a management token. The minimum unit is 1 and cannot be split. It is used to realize the ownership and management rights of the NEO network, and represents the voting rights and income rights of the small ant system. Among them, the voting rights include voting for the accountant election, NEO network parameter changes, etc., and the income rights include proportional acquisition of GAS. NEO management tokens can be transferred. GAS is a fuel token. The minimum unit is 0.00000001, which is used to realize resource control when using NEO network. It represents the right to use the small ant system and is used to pay the block chain byte fee. The initial amount of GAS is zero and is gradually distributed to NEO holders over time. In the creation block of the NEO network, 100 million NEOs have been generated, and GAS has not yet been generated, and the number is zero. The 100 million pieces of GAS corresponding to 100 million NEOs will be gradually generated into the address of the NEO management token in about 22 years by an attenuating algorithm. After the NEO management token is transferred to the new address, the subsequent GAS will also be generated at the new address.

3.3. NEO's token incentive mechanism

NEO divides a total of 100 million NEOs (small ant shares) into two parts. The first part of 50 million NEOs is distributed to NEO development fundraising supporters in rounds and proportions. This part

has been distributed. The second part of the 50 million NEO is managed by the NEO Council to support the long-term development, operation and development and ecological development of the NEO network. So far, NEO has carried out three rounds of fundraising, including one round of initial fundraising and two rounds of ICO, and there will be no ICO in the future. When the project was established in June 2014, the seven founding members raised 5 million yuan themselves and received 10 million investment from Pre-Angel Rachel Capital, with a total of 15 million seed funds. On October 20, 2015, NEO officially started the first crowdfunding ICO1 on the micro angel website. The financing target was NEO (small ant stock), the financing target was 1400-2100 bitcoins, and the financing was completed on October 31, 2015. It sold 16 million small ant shares and raised 2,100 bitcoins, which was converted into about 4.2 million yuan according to the market value at that time. On August 8th, 2016, NEO's second crowdfunding ICO2 started. The financing target is still NEO (small ant stock), but there is no upper and lower limit of financing. At the end of September 7, 2016, the financing is over, totaling 2400. Ten thousand ant stocks raised 6119 bitcoins and converted about 25 million yuan according to the market value at that time. The remaining 10 million small ant shares are owned by early investors. The total market value of NEO's three rounds of financing is about 44.6 million. The current global market capitalization of NEO and GAS is about 26.4 billion yuan and 1.5 billion yuan respectively. The sum is about 626 times of the original financing amount. It can be said that NEO is to some extent. It is a fairly successful block chain open source project.

So, how does NEO specifically use tokens to motivate participants in the project? In NEO, there are also four roles of project leaders, developers, users, and investors. NEO uses different incentives for different roles.

The first is project leaders and developers. The leader of NEO is the NEO Council, which is responsible to the NEO community to promote and develop the NEO Ecology as its primary goal. According to the white paper issued by NEO, the 50 million small ant shares managed by the NEO Council are in the initial stage of lock-up period. When the NEO network runs for 1 year on October 16, 2017, it can be unlocked and used. This part of NEO does not. Will enter the exchange trading, only for long-term support NEO projects, and plan to 10 million (10% of the total) to motivate NEO developers and NEO board members, 10 million (total 10%) for incentives NEO surrounding eco-developers, 15 million copies (15% in total) are used to cross-invest in other block chain projects. The tokens obtained are attributed to the NEO Council and are only used for NEO projects, 15 million (15% in total)) Maneuvering, while stipulating that the NEO used each year should not exceed 15 million in principle. In November 2017, NEO unlocked 15 million NEOs to reward councils and developers, bringing the current circulation of NEO to 65 million.

For developers, NEO's principle is to contribute and reward, and has already rewarded many developers. Among them, the City of Zion (CoZ) community is a team of open source enthusiasts to provide support for NEO, so the NEO Council subsidizes the community by issuing NEO awards, and CoZ reuses funds for the community. Contributions are rewarded. Inspired by this incentive, members of the CoZ community worked full-time on the NEO network to develop a variety of infrastructure for NEO, including browsers, wallets, Dapps, etc., to make a significant contribution to the improvement of the entire NEO ecosystem. With the increase in the market value of NEO, NEO's early community developers and promoters have achieved considerable benefits, and even can be said to achieve financial freedom to some extent, stimulating more and more developers to join the NEO project.

In terms of incentives for users, on the one hand, NEO networks charge transaction fees for the operation and storage of token transfers and smart contracts, so the bookkeeper can obtain GAS (small ant coin), and GAS can also circulate in the secondary market. Thereby achieving economic incentives for bookkeepers. On the other hand, NEO controls the resources on the block chain through GAS, and GAS can have the right to initiate transactions, which also prevents the abuse of resources. One of NEO's cleverness is that it decouples GAS and NEO. NEO represents the ownership of the NEO network. NEO holders have the right to vote for the bookkeeper, and GAS is used for all operations on the NEO network, such as GAS is required to register or change assets on the NEO block chain, and these GASs are assigned to all NEO holders. By decoupling NEO and GAS, you can motivate a reduction in transaction

costs. Because high transaction costs can benefit the book-makers, and also prevent people from wanting to register assets on the block chain, and the registered assets are reduced, the GAS obtained by NEO holders will also be reduced, thereby stimulating the reduction of transaction costs.

Investor incentives, for the early investors of the seed round, the seven founding members and Pre-Angel Rachel Capital received a total of 10 million NEO (small ant stocks), accounting for 10% of the total. At the same time, NEO has also set up some investor incentives in the crowdfunding phase. First of all, ICO2 has set up an “early bird” reward system. ICO2's NEO is divided into two parts, including 20 million fixed parts and an additional part of no more than 4 million shares. The sooner the reward part participates in the reward, the more rewards can be obtained by up to 20% of the investment. The preferential price encourages investors to invest earlier. Second, NEO encourages investors to invest as much as possible by making additional awards to the top 100 accounts with the largest number of bitcoins. Finally, by calculating the number of NEOs the investor is assigned to, it may be a non-integer, and the minimum unit of NEO is 1 and cannot be split, so the zeros when rounded up will be accumulated and finally presented to the crowdfunding participants through the lottery. This has attracted more investors to participate in ICO. On December 5, 2017, NEO announced the “NEO Funder Rewards Program” implementation rules on its official website, and unconditionally gave the same amount of feedback to all the early funders who participated in ICO1 and ICO2. After the reward program is completed, NEO will become the world's first block chain open source project for the full return of sponsors. A series of investor incentives are carried forward, which not only greatly stimulates investors' confidence in NEO to participate in NEO's fundraising activities as early as possible, but also attracts people outside the NEO community to pay attention to and participate in the development of NEO.

In summary, NEO's use of small ant stocks and small ant coins to stimulate the participants of the project is relatively successful. First, after three rounds of financing, 50% of NEOs are allocated to investors, and through incentives such as “early bird” rewards, large rewards, random donation of NEO, and full feedback, investors are encouraged to invest as much as possible in the project as early as possible, to raise sufficient start-up funds and development funds for the project. The project leader NEO Council was given the authority and responsibility to manage another 50% of NEOs, as part of the Remuneration Council's ability to obtain a portion of NEO. At the same time, NEO core developers and developers of surrounding ecosystems can also receive NEO awards through the contribution code, and the NEO used in the project is not allowed to exceed 15 million in principle, and the developers who pay attention to the market through long-term distribution of tokens Will get more cooperation, start quickly and complete development as soon as possible. Through the fuel token GAS, the project also achieved incentives for bookkeepers, and the decoupling design of NEO and GAS led to a reduction in transaction costs on the network, which motivated more users to join the NEO network, enabling the project to continue to develop and keep growing.

4. Conclusion

This paper studies the huge success of the issuance of modern coins to encourage more people to join the block chain project. The token incentive mechanism is effective in providing funds and generating incentives for project development. By managing token NEO and fuel token GAS, NEO adopts different incentives for project leaders, developers, users and investors, which not only raises the funds needed for project development, but also attracts more contributors and followers. Become a more successful block chain open source project.

But the incentive mechanism for tokens also has limitations. On the one hand, there is a mixed strategy Nash equilibrium after developers and investors have tokens. When investors are optimistic about the future development of the project, it will be reflected in the high market price of the token in the current period, but at this time the developer will choose to sell the tokens held to obtain the proceeds, without the need to develop the project. Contribution. Conversely, when investors are not optimistic about the future development of the project, the current market price of the token is lower, the developer will choose to continue to hold the token, and strive to develop so that the token can appreciate in the future. Developers have a random nature in the choice of holding or selling tokens, so that investors get

the same amount of money when they buy tokens, which is not conducive to motivating investors to invest. On the other hand, token sales with a fixed price or cap will generally be completed soon. If a person or group holds most of the tokens and the tokens are poorly distributed, it will bring centralization risks, which is not conducive to the block chain. The development of the project.

After experiencing the upsurge of block chain project creation and investment, it is necessary for project participants to raise their understanding of tokens, and to promote the block chain open source project to be more cautious in designing token distribution schemes, triggering industry self-regulation and ensuring fairness. Distribution and practical application, return to the original intention of the block chain token distribution - incentives for the ecosystem.

References

[1] Yuxia Zhang, Minghui Zhou, Wei Zhang, et al. Participation Model of Business Organizations in OpenStack Open Source Community [J]. Journal of Software, 2017, 28 (6): 1343 - 1356.
[2] Xiaohong Chen, Yuan Zhou, Wei Su. Research on the Relationship between Distributed Innovation, Knowledge Sharing and Open Source Software Project Performance[J]. Studies in Science of Science, 2016, 34 (2): 228 - 235.
[3] Hars A, Ou S. Working for free Motivations of participating in open source projects[J]. International Journal of Electronic Commerce, 2002, 6 (3): 25 - 39.
[4] Hertel G, Niedner S, Herrmann S. Motivation of software developers in Open Source projects: an Internet-based survey of contributors to the Linux kernel [J]. Research Policy, 2003, 32 (7): 1159 - 1177.
[5] Lakhani K R, Wolf R G. Why hackers do what they do: Understanding motivation and effort in free/ open source projects[M]// J. Feller (Ed.). Perspectives on free and open source software. MIT Press, 2005: 3 - 21.
[6] Bitzer J, Schrettl W, Schröder P J H. Intrinsic motivation in open source software development [J]. Journal of Comparative Economics, 2007, 35 (1): 160 - 169.
[7] Jiajia Tan. The open source community of domestic open source software developers continues to participate in research [D]. Zhejiang University, 2008.
[8] Yu Wang. Open Source Innovation: Incentive Diversification and Private Effective Provision of Public Goods[J]. Contemporary Finance and Economics, 2013 (10): 36 - 45.
[9] Ye Y, Kishida K. Toward an understanding of the motivation of open source software developers[C]// International Conference on Software Engineering, 2003. Proceedings. IEEE, 2003: 419 - 429.
[10] Barcellini F, Détienne F, Burkhardt J M, et al. Participation in online interaction spaces: design-use mediation in an Open Source Software community. [J]. International Journal of Industrial Ergonomics, 2009, 39 (3): 533 - 540.
[11] Sha Sha. Comparative Study on Sustainability of SOURCEFORGE Open Source Community Project [D]. South China University of Technology, 2014.
[12] Canidio A. Financial incentives for open source development: the case of Blockchain [J]. Mpra Paper, 2018.
[13] Wei Li. Will Bitcoin become a currency [J]. Contemporary Economic Research, 2015 (4): 60 - 65.