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**Abstract** The tokenomics of Initial Coin Offerings is a new field of research. The wording Initial Coin Offering is only a few years old, the field of tokenomics is even younger. This chapter will discuss the parameters of the tokenomics of Initial Coin Offerings in a qualitative and quantitative way to gather knowledge about upcoming standards and the definition of current requirements. As more and more Initial Coin Offerings coming to the market, a fundamental view of tokenomics is required. This chapter identifies 13 important parameters of tokenomics. Each of them is examined by literature and the used sample data set. Further parameters are identified as well as further research objectives in the field of tokenomics.

## 1 Introduction

Initial Coin Offerings raise funding through the creation of token by smart contracts. The newly created token (or minted token) are partly sold to fund ideas and networks. A set of parameters is used to define these new tokens to create an economic value. This definition can be called tokenomics. Hence, tokenomics describe the function and parameters of the offered token in an Initial Coin Offering (ICO) process. The tokenomics is a fundamental part of each ICO. In the tokenomics of ICOs the economic design of the offered token is defined by applied parameters.

The aim of this chapter is to identify important parameters. The research is based on two steps. First, the most important parameters in tokenomics will be identified by a qualitative discussion of literature. Second, the identified parameters will be examined quantitatively on a set of selected ICOs. The aim of the research is to identify the most important parameters of ICOs and to quantify these parameters as usable parameters for future ICOs.

The used set of data of ICOs consists of 98 closed and announced ICOs. It is only a small part of the overall ICO universe and the data is skewed with 88 data sets to 2018. The set of data is not fully representative, but may give hints how the selected

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qualitative parameters have been used during 2018. Further research may apply to this selection of qualitative parameters to gain further insights. The data was collected from the respective whitepapers of the projects and from sources as [icobench.com](http://icobench.com), [icorating.com](http://icorating.com), [icodata.io](http://icodata.io) and [tokenmarket.com](http://tokenmarket.com).

## 2 Initial Coin Offerings

ICOs do have a main advantage for the founders: ICOs do not dilute their equity stake for financing (Kaal 2018, p. 2). Other advantages are freeing investors from their home bias, and removing the need for financial intermediaries (Boreiko and Sahdev 2018, p. 3).

Also the high cost of traditional Initial Public Offerings (IPOs) with 4–28 million USD in the US (Preston 2018, p. 328) directs the way to ICOs. The costs of ICOs can be ten times lower than IPOs (Dell’Erba 2017, p. 11) or ICOs are even seen as a low-cost fundraising option (Lipusch 2018, p. 11). Whereas the IPOs are often seen as exit strategies, the ICOs are more entry strategies to finance the idea (Felix 2018, p. 5). ICOs, acting as a new form of investment, create “significant level of information asymmetry” (Felix 2018, p. 10). In particular, the information asymmetry in ICOs is pronounced for small investors (Fisch 2018, p. 6).

Long (2018) states that ICOs offer “low friction costs—there are no underwriters, trustees, transfer agents, exchanges, custodians, clearinghouses or central securities depositories”. ICOs disrupt the traditional capital market in the venture capital and investment bank world. ICOs raised 7.2 billion USD in the second quarter of 2018, 45% of the amount of traditional Initial Public Offerings (IPOs) and 31% of traditional venture capital in the second quarter of 2018 (Long 2018).

## 3 History of ICOs

The phrase Initial Coin Offering and ICO was created by the US-based gaming start-up “Breakout” in November 2014 (Boreiko and Sahdev 2018, p. 13). The ICO history started even before 2014 with 2 ICOs raising 630 k USD in 2013. In 2014, 11 ICOs raised 33 million USD, 14 ICOs raised 11 million USD in 2015 (Boreiko and Sahdev 2018, p. 11). In 2016, 74 ICOs were realised and in 2017 more than 1000 ICOs (Benedetti and Kostovetsky 2018, p. 9). However, 37% of all proceeds were made by only 20 ICOs (Momtaz 2018a, b, p. 9).

The crowdfunding company Kickstarter raised 3.6 billion USD since its inception in 2009. In contrast, ICOs raised 7.5 billion USD in 2017 alone (Amsden and Schweizer 2018, pp. 2–3). In total, more than 18 billion USD were raised through ICOs between 2014 and June 2018 (Howell et al. 2018, p. 1). Momtaz (2018b) even states a number of 21 billion USD in ICO fund raising from 2013 to 2018. The

success of ICOs is disrupting the traditional centralized venture capital and investment bank models (Boreiko and Sahdev 2018, p. 10).

## 4 Literature Review of Parameter of Tokenomics

The parameters of tokenomics are important for ICOs. In the literature different parameters are discussed and even some parameters found in white papers have not been discussed in the reviewed literature so far.

One of the main discussion is about the token type, i.e. is it an utility, security, or payment token (or medium of exchange and store of value “coins”) according to Howell et al. (2018, p. 1). The discussion about the segmentation is extensive, the Swiss regulator FINMA classifies three token categories—payment tokens, utility tokens, and asset tokens (FINMA 2018, p. 3). Howell et al. (2018, p. 4) find that 68% of all token in their sample are utility token. The token type is identified as first parameter.

A further parameter belongs to the used technical standard of the token. The technical standard depends on the use of the respective blockchain. For example, EOS, NEO, Ethereum are blockchains from which tokens could be used in the ICO.

Momtaz (2018a, p. 8) finds a market share of more than 80% for ERC20 (Ethereum Request for Comment 20) tokens. Other research shows that 74% of tokens using an ERC20 definition (Howell et al. 2018, p. 23). Felix (2018, p. 20) finds in the examined data set even a use rate of 84% of the Ethereum platform. Adhami et al. (2018, p. 13) find only an Ethereum use rate of 56.5%.

Overall, the majority of all tokens use the ERC20 standard. The technical standard is defined as the second parameter.

Another important parameter is the standard issue price at a public ICO. A median value of 0.30 USD was found to gather behavioral investors attracted to low nominal prices (Benedetti and Kostovetsky 2018, p. 16). Felix (2018, p. 22) finds as issue price a median value of 0.20 USD. The public ICO price is also used as reference price for private sales. The standard issue price is set as third parameter.

An open question is in which currency the ICO is priced. The main differentiation is between fiat and crypto currencies. If the segmentation between these two is set, the open question is in which currency of the segments (i.e cryptocurrency or fiat) the ICO is priced. The data set sample will be examined for the standard currency, being the fourth parameter.

The question about the standard currency leads to the question which currencies are accepted as means of payment for the ICO. The acceptance of fiat currencies can be seen positively (connections to the traditional banking system) and negatively (lack of confidence to complete the ICO with cryptocurrencies, no protection of a soft-cap through smart contracts), overall the acceptance of fiat currency increases the uncertainty of the venture (Amsden and Schweizer 2018, p. 19). Momtaz (2018a, p. 17) finds that ICOs accepting fiat raise on average more as it reduces the barrier to entry. However, accepting Bitcoin (BTC) or Ether (ETH) has a positive association

with success, 66% accept Ether but only 10% USD (Howell et al. 2018, p. 25). The literature review does not show a definitive result for this important parameter, currency acceptance, which is selected as the fifth parameter.

ICOs were done initially without regulatory processes and any reference to processes as Know Your Client (KYC), but starting in 2017 a growing number of ICOs were using KYC processes (Smith + Crown 2017). Tezos even demanded a KYC 11 months after the ICO ended (Devoe 2018). As KYCs are done regularly today, the cost for it require minimum contributions to the ICO. Minimum contribution requirements signal that the founders are confident in the quality of their offering (Amsden and Schweizer 2018, p. 20). The minimum contribution is applied to the public ICO sale.

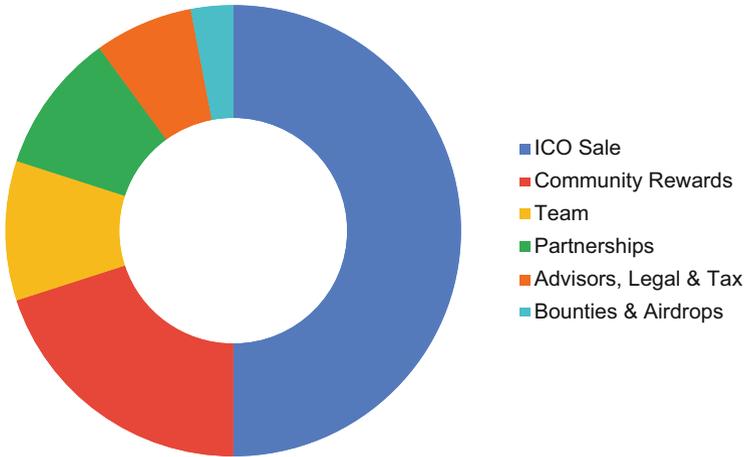
Before this public sales phase starts, the private sale may sometimes be executed. The private sale is only open to accredited and institutional investors who have to invest high minimum contributions (e.g. 100,000 EUR at Helix Orange (2018)). Private sales are used to attract sophisticated investors (Amsden and Schweizer 2018, p. 37) and to cover the setup costs of ICOs (Amsden and Schweizer 2018, p. 17). 44% of ICOs conduct a private sale (i.e. pre-ICO sale) according to Montaz (2018a, p. 8) and 36% according to Felix (2018, p. 22). Benedetti and Kostovetsky (2018, p. 16) find that 40% of ICOs hold a private sale. A private sale and the pre-ICO equity investment of venture capital companies (VCs) may signal quality (Howell et al. 2018, p. 3). In their sample, 45% of ICOs use a private sale to fund the ICO, certify the issuer and to determine demand (Howell et al. 2018, p. 12). Quite interestingly, Felix (2018, p. 10) finds that private sales reduce underpricing.

The literature research shows clearly the importance of the parameter private sale to be selected as the sixth parameter. The selling phases are often incentivised by bonus or discounts. The earlier the investor commits the capital to the sale of the token, the higher the bonus or discount. A bonus or discount in the private sale can be related to the success of the ICO, but no evidence is found in the literature (Amsden and Schweizer 2018, p. 37). Adhami et al. (2018, p. 13) finds a bonus in 54.8% of the examined ICOs.

The sales process furthermore consists of the observable sales duration of the public ICO. Private sale phases are often not stated, hence they are less observable. Benedetti and Kostovetsky (2018, p. 16) find that the average ICO takes 37 days with a median of 31 days, however the average was rising to 41 days for ICOs in 2018. The public sales duration is identified as seventh parameter.

The sale process requires also the overall amount of token to be sold. The overall amount consists of the sellable token plus the other distributed tokens plus the in future minted tokens. Bitcoin will get close to a total supply of 21 million token, XRP will have a maximum supply of 100 billion token. This eighth parameter is the total supply.

Some ICOs do use minimum funding amounts, so called soft caps, and maximum funding amounts, so called hard caps. The soft cap is seen as a protection mechanism for investors, i.e. if the amount of the soft cap is not reached all contributions are returned to the investors. This reduces uncertainty and decreases investor risk (Amsden and Schweizer 2018, p. 19). Research shows that a hard cap increases



**Fig. 1** Token allocation

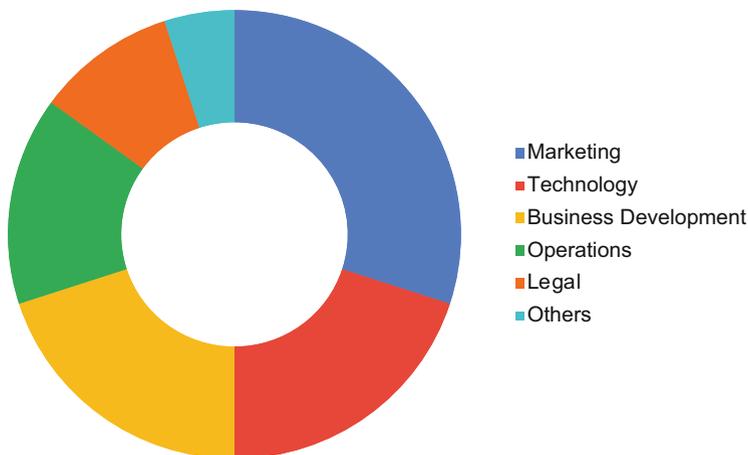
the probability of token tradability and the amount raised in the ICO (Amsden and Schweizer 2018, p. 37). The ninth parameter is the soft and hard cap.

The sale process requires also the quota of tokens to be sold in relation to minted tokens. The sellable token amount is set in relation to the overall number of token to get the total supply number in percentage terms. Benedetti and Kostovetsky (2018, p. 16) find that 60% of all tokens are sold on average during the ICO. Howell et al. (2018, p. 25) find that 54% of total token supply is sold. Conley proposes to sell all tokens available and use parts of the proceeds for business development, salary payment and other uses instead of holding back tokens (Conley 2017, p. 10). The sale quota may show the investors if their purchased tokens will be diluted in future, hence the proposal of Conley can be seen as a try to prevent future dilution of the purchased amount of tokens. The sale quota is identified as tenth parameter.

Not all the tokens are sold, but allocated to different parties. The token allocation shows where the overall token supply is allocated to. The token allocation is a main part of the white paper. Often, it is illustrated as a doughnut. Token allocation is defined as the eleventh parameter. An example of the token allocation can be seen in Fig. 1.

Investors are also interested in the distribution schedules of amount of token for the team (i.e. founders, team members) and the advisors. These distribution schedules are also termed vesting schedules. Howell et al. (2018, p. 23) describe that 36% of their examined ICOs have some kind of vesting schedule. Smith + Crown (2017) describe that vesting was rare up to 2016, starting in 2017 vesting schedules have a duration of up to 36–48 months.

Tokens allocated to the ICO are sold against fiat or cryptocurrency. Investors want to know where the money is going to in the project. The money may be used for marketing, technology, business development, legal, operations and other functions.



**Fig. 2** Use of sale proceeds

This use of sale proceeds is the twelfth parameter and also often illustrated as doughnut, as shown for example in Fig. 2.

The creation of tokens is accompanied by the fact, that tokens are tradable. In contrast, venture capital investments are illiquid and it is difficult to monetize them in the near term, they may be monetized only through an exit (i.e. sale as through an IPO) after some years. In contrast, tokens could be traded immediately. Amsden and Schweizer find in their research that a tradable token is of the “utmost importance” (Amsden and Schweizer 2018, p. 14). However, it is not important for every ICO, e.g. Polkadot raised 140 million USD in Ether in October 2017 (Russo and Kharif 2017) with the announcement to release their “DOTs” in the third quarter of 2019 (Polkadot 2017).

Tradability also creates interest in ICOs so that capital can be collected. The overall amount of money collected in ICOs is large especially when compared to the raised amounts of money from Kickstarter in a much longer time frame. Also, founders and investors want to understand how much money could be raised for their projects.

The average successful ICO raised 11.5 million USD with a median of only 3.8 million USD according to Benedetti and Kostovetsky (2018, p. 16). Howell et al. (2018, p. 25) found an average raise of 15.8 million USD in their data set. Hence, capital collected is identified as thirteenth parameter in this research.

In total 13 parameters were identified to play an important role in the field of tokenomics. However, each ICO is different, a clear standardization is not established yet. Further parameters may become important in individual ICOs or over time. Also, some of the defined and identified parameters may be not applicable to every ICO.

The identified parameters are:

1. Token Type
2. Technical Standard
3. Standard Issue Price
4. Standard Currency
5. Currency Acceptance
6. Private Sale
7. Public Sales Duration
8. Total Supply
9. Soft Cap and Hard Cap
10. Sale Quota
11. Token Allocation
12. Use of Sale Proceeds
13. Capital Collected

## 5 Research of Parameter of Tokenomics

The used set of data of ICOs was examined for the identified parameters. As the examined data set is skewed to 2018, it is interesting if there are differences to the data of the literature which is only partly from 2018.

### **Parameter 1: Token Type**

There are 68% of utility token in the sample of Howell et al. (2018, p. 4) and 68.7% in the researched sample. In addition, there are 31.3% payment token in the examined sample and no other token types.

### **Parameter 2: Technical Standard**

The literature shows a use rate of 56.5–84% of ERC20 tokens, the examined sample of this report finds even 87.7% of tokens using the ERC20-standard.

### **Parameter 3: Standard Issue Price**

In the literature a median price of 0.20–0.30 USD per token was found, the data set shows a mean of 0.40 USD with a median of 0.10 USD in the sample.

### **Parameter 4: Standard Currency**

The sample set exhibits that 76.54% of the ICOs are priced in USD, 19.75% are priced in ETH and 3.7% in EUR.

### **Parameter 5: Currency Acceptance**

Accepting BTC or ETH has a positive association with success, 66% accept ether but only 10% USD (Howell et al. 2018, p. 25). The sample data shows that 34.44% of the ICOs only accept ETH, 20% accept ETH, BTC and other cryptocurrencies, and 16.67% accept ETH and BTC only. ICOs accept fiat only in 28.29% whereas ETH, BTC and fiat is 15.56%, ETH, BTC, fiat and other cryptocurrencies are 10%, and ETH and fiat is only in 3.33% accepted.

**Parameter 6: Private Sales**

The literature shows that in 36–45% of the ICOs a private sale is executed. The data set shows a private sale in 8.16% of the ICOs. However, as most whitepaper do not mention a private sales, and even if mentioned the conditions are often not stated to the public.

**Parameter 7: Public Sales Duration**

The data exhibits a median of 31.5 days as duration of the public sales which confirms the 31 days of duration found in the literature review.

**Parameter 8: Total Supply**

The median of total supply of token in the ICOs of the data set is 775 million token.

**Parameter 9: Soft Cap and Hard Cap**

The soft cap is in place in 66.3% of the ICOs, a hard cap in 84.7% of the ICOs. The relation between the soft and hard cap, i.e. the minimum amount raised to be viable and the maximum amount raised, is shown with a number of 17.3% for the soft cap relative to the hard cap or 5.78 times the soft cap to get to the hard cap.

**Parameter 10: Sale Quota**

The review of the literature exhibits a sale quota of 54–60%. The evaluation of the used data set finds a mean of 53.3%, quite close to be in line with the facts of the literature review.

**Parameter 11: Token Allocation**

The sample data set shows that 55.5% of the allocated tokens go to the ICO, 11.6% into reserves, 8.2% to the team, 8.1% to the business development and marketing, 3% to advisors, 2.9% to bounties and airdrops, and 11.7% of the allocation to other functions (e.g. referral programs, incentives, consultants, CSR, foundations, future release, charity and more).

**Parameter 12: Use of Sale Proceeds**

The development of the business is with 38% the leading target for the proceeds of the ICO sale. The marketing function follows with 27%, followed by operations with 14% of the proceeds. Finally, 6% go to legal and 15% to other areas (e.g. technology, reserves).

**Parameter 13: Capital Collected**

Mean values of 11.5–15.8 million USD and a median value of 3.8 million USD for the fund raising through an ICO were found in the literature review. In the used sample, a value of 5.97 million USD was found for the capital collected. The reasoning behind this difference could be the omission of huge ICOs as Telegram and EOS, which raised around 6 billion USD alone. Also, the increasing number of ICOs in 2018, may have decreased the overall amount per individual ICO.

An overview of the parameters and a comparison of the sample findings and the literature research findings can be observed on Table 1: Tokenomics Parameter.

**Table 1** Tokenomics parameter

Tokenomics parameter	Sample findings	Research findings
1. Token type	68.7% utility, 31.3% payment	68% utility
2. Technical standard	94.9% ERC20	56.5–84% ERC20
3. Standard issue price	Median: 0.10 USD	Median: 0.20–0.30 USD
4. Standard currency	76.54% USD, 19.75% ETH, 3.7% EUR	–
5. Currency acceptance	34.44% ETH only, 20% ETH, BTC and other cryptos, 16.67% ETH and BTC, 28.29% fiat and crypto	66% ETH, 10% USD
6. Private sale	8.16% of ICOs	36–45% of ICOs
7. Public sales duration	Median: 31.5 days	Median: 31 days, mean: 37 days (41 days in 2018)
8. Total supply	Median: 775 million	–
9. Soft and hard cap	66.3% soft cap, 84.7% hard cap, soft cap is 17.3% of hard cap	–
10. Sale quota	Mean: 53.3%	54–60%
11. Token allocation	55.5% ICO, 11.6% reserves, 8.2% team, 8.1% business development and marketing, 3% advisors, 2.9% bounties and airdrops, 11.7% other	–
12. Use of sale proceeds	38% development, 27% marketing, 14% operations, 6% legal, 15% other (tech., reserves)	–
13. Capital collected	Mean: 5.97 million USD	Mean: 11.5–15.8 million USD Median: 3.8 million USD

## 6 Conclusion

This chapter shows that many parameters become important in the field of tokenomics. The literature review identified single parameters which are important to follow. Overall, a number of 13 parameters were used in the research of a data sample collected from white papers and resources as [ICObench.com](http://ICObench.com). The quantitative results of the 13 parameters were compared to the findings of the literature review. Some parameters as token type, public sales duration or the sale quota were confirmed.

Other parameters were different to the findings in the literature research, i.e. the higher use of the ERC20 technical standard, the lower median standard issue price, the accepted currency in ICOs or the lower amount of capital collected in the data set. Other parameters were introduced in the literature review and quantified in the research of the sample set. The standard pricing of ICOs in USD with 76.54%, the total supply with 775 million token or that 66.3% of the ICOs use a soft cap and even 84.7% use a hard cap. Also that the hard cap is higher by the factor of 5.78 to the soft

cap. Furthermore, the token allocation and the use of the sale proceeds were quantitatively introduced through the examination of the data set.

By studying white papers it is becoming obvious that further parameter can be identified and should be researched. A proposal for further research is the following list:

- Bonus structures of ICOs
- Underwriting of ICOs in the secondary market
- Length to listing and its implication
- Length of the individual sale phases and the overall duration of the ICO sale
- The total token supply and its market effects
- Token supply in the ICO selling phases
- Vesting structures

Tokenomics is developing itself fast as a new field of finance research. This chapter shall help to uncover this new field area.

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