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# Digital transformation: statistical evaluation of success factors of an ICO-campaign

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**Abstract.** High rates of growth of the ICO market and its excess returns stipulate a significant interest of investors to projects which use initial token allocation (ICO) for attracting investments. This work takes into account the fact that even a potentially profitable project may fail to collect the required amount of money and to start placing tokens on the stock exchange. We are speaking about success of an ICO-campaign for fund raising. In order to estimate the influence of factors and check the suggested research hypotheses, logistic regression was used. The selection included 672 projects. As a dependent variable, the proportion of the amount collected in the ICO process from the required value is selected. Depending on the tested hypothesis the influencing variables took into account the presence of a pre-sale stage and the bounty program and also the price of the token, the upper limit of fund raising, the duration of the ICO-campaign and the number of team members. The work results allow token emitters to substantiate managing the success of the ICO-campaign of the project and the investors to see whether it deserves their attention. Besides, the obtained materials can be useful for specialists in forming the legal framework of token transactions.

## 1. Introduction

The last decade has brought such technologies as “Blockchain”, “Big Data”, “Internet of Things” and “Artificial Intelligence” into our lives. They induce the appearance of new IT-companies and startups on the market which aim at implementing different innovative ideas.

Both abroad and in Russia, there is a lack of financing of young companies. Approximately since 2016, such method of accessing investments as ICO (Initial Coin Offering, one of the variants of translation — primary placement of tokens) has been developed on the market. It is one of the methods of crowd-funding [1]. According to reports [2, 3], Initial Coin Offering is quickly gaining popularity and it is considered to be a promising trend in corporate financing.

This form of attracting capital consists in selling to investors a fixed quantity of new tokens obtained with the help of one-time emission. A token is an electronic record in the chain of blocks which fixates the right of its holder to use the platform services, buy goods, hire employees and other possibilities formalized in a smart-contract [4]. The prototype of a modern ICO is described in the work of de Bono [5] where it is suggested to create a personal internal currency for a company. Combining the given idea with the blockchain technology [6] we get an ICO. It is important to note that tokens are similar to currencies but not to security papers (see [7]).



The growth of the ICO market is being restrained by a range of factors. One of the most important factors is insufficient elaboration of instruments for forecasting the success of a project and a company ICO. For example, some standards declare that if the required amount of money is not obtained (“soft cap”) the company will return the money to investors. However, it happens quite often that denial of responsibility is specified in the documents. It provokes the emergence of many fraudsters. According to the statistics, only 23% of projects are profitable [3]. Investors lose their money because very often they are ruled by their own insights.

Objective choice is possible with the availability of tools to identify promising projects. Usually, such instruments are based on prediction of the future profitability of tokens. Publications have appeared where one can see the attempts to determine the factors which influence the success of an ICO and forecast the future earning capacity of tokens. They are, for example, the number of the issued tokens, investors' strategies, growth and size of the market. Adhami, Giudici and Martinazzi [8] also specify the number of tokens in the offering as the key variable. In their turn, Cong, Li and Wang [9] and Li and Mann (2018) [10] pay their attention to the importance of the behavior of economic agents.

The success of an ICO-campaign is evaluated in a number of other works. Factors which influence the amount of money attracted by the project are being studied in them. Thus, for example, Saman Adhami, Giancarlo Giudici and Stefano Martinazzi [8] take into account the presence of a White Paper (a document with detailed information on the project), open code of a project, tokens pre-sale, bonuses, legal regulation. It has become clear, for example, that a White Paper doesn't influence the success of an ICO-campaign. The other author, Christian Fisch [11], analyzes the influence of Bitcoin price, the year of ICO, venture and technical characteristics. Almost all venture variables have turned out to be insignificant. The analysis of primary sources demonstrates the necessity of continuing research in this direction.

The results of the enumerated ones and other works were taken into account during elaboration of an investment model in the work [12]. Approbation has demonstrated the possibility of its use for forecasting profitability of tokens. However, the model doesn't take into account an ICO-campaign. High profitability may be forecasted but the project will meet with failure at the stage of fund raising. In order to correct the given situation, it is necessary to elaborate an additional instrument for estimating the success of an ICO-campaign before calculating the token profitability. In this article we focus our attention exactly on this aspect.

We summarize the above. It is important for an investor to know the likelihood of a successful fundraising and for the issuer to manage at the ICO stage of the project life cycle— factors that contribute to achieving the desired positive result. The aim of this work is solving the specified problems.

## **2. Research methodology**

An ICO-campaign is considered to be successful if the project has raised the minimum required amount (“soft cap”). Let us determine which factors repel and attract potential investors.

In order to heighten their interest such methods are often used as carrying out the pre-sale stage and the “bounty program”. The first is implemented so that by the time the main fund-raising begins, the project already has a certain amount in the account. It allows the investors to understand that the given ICO-campaign arouses interest. One can suppose that the pre-sale stage positively influences the result of the entire ICO-campaign. As for the “bounty program”, its main goal is the project promotion [13]. Special people with high popularity in social networks are being hired. It is supposed that advertisement contributes to promoting and growth of the project popularity in social networks. On the other hand, the bounty program performers' qualification is very often insufficient. As a result their activity may have no influence or even destroy the project's reputation. Let us formulate the first hypothesis:

*H1: The presence of such elements in an ICO-campaign as pre-sale and a bounty program contributes to attracting capital.*

We will detail H1 in the form of two statements:

H1.1: *The presence of pre-sale increases the probability of an ICO-campaign success.*

H1.2: *The presence of a bounty program increases the probability of an ICO-campaign success.*

Before the beginning of the tokens sale the project specifies the characteristics of the primary placement campaign, in particular, the volume of emission, price, duration of sale and other ones [4]. As ICO is a sort of crowd-funding the main part of funds raised comes from private individuals and their budget is quite limited. This means that high-priced tokens are likely to be sold worse.

The other important factor is “hard cap”, that is, the highest upper limit of fund raising set for this project. The higher it is the larger is the number of investors that has to be involved in the project. Not everyone succeeds in it and only 34% of projects have managed to raise the specified amount of money [14]. Thereby, one can assume that the presence of a large hard cap may frighten the investors and it also requires significant finance contributions in the marketing campaign [15].

Let us discuss such factor as the duration of an ICO-campaign. The process of tokens sale may last from one day to several months. The duration has direct influence on the investment solution. If the duration is long enough investors can study the project in details and make a well-considered decision. However, one should take into account the effect of lost profit. According to the studies of behavioral economics [16, 18], it impacts more and more young people. It is expressed in high sensibility of people to financial events of a shorter duration. Thus the impression of a limited and exclusive offer is created. We can suppose that the shorter the ICO-campaign is the more funds the project can raise. Let us formulate the second hypothesis:

H2: *Such characteristics of an ICO as the hard cap and the token price should be at such a level as the investors are able to afford to take part in crowd-funding. At that, the duration of the ICO-campaign should be as short as possible.*

Let us specify H2 in the form of three statements:

H2.1: *The high price negatively influences the probability of an ICO-campaign success.*

H2.2: *The high hard cap frightens investors and lowers the probability of an ICO-campaign success.*

H2.3: *A short ICO-campaign increases the probability of an ICO-campaign success.*

Finally, we will consider the project team as an indicator which is able to influence the result of an ICO-campaign. The presence of a qualified team is highly valued by investors. It means that there is a leader, technical implementers and also marketing and finance specialists. If the platform, for example on the basis of the blockchain technology, is being developed by means of outsourcing then there is a risk that in the case of a technical failure the team will not be able to eliminate it and the project will become vulnerable. The availability of own marketing specialists and financial experts adds brownie points. Their knowledge of nuances and intricacies of the business helps to efficiently cooperate with investors. Thus, we can suggest the third hypothesis:

H3: *The availability of a great number of specialists in the team makes it more attractive for investors.*

In order to check the hypotheses and calculate the ICO-campaign success, logistic regression is used. The values and statistical significance of coefficients, necessary for that, were calculated in the R studio package. The company's success was chosen as a dependent variable; it was equal to 1 when the funding request was fully completed and to 0 — otherwise. The variables which are responsible for the pre-sale and “bounty program” were included in the regression equation for testing the H1 hypothesis. Both of them belong to the class of dummy variables. Such variables as the token price — price (in dollars), hard cap — cap (in dollars) and the duration of an ICO-campaign — week (in weeks) were used for H2. For the hypothesis, H3 — the number of the team members (team).

When making investment decisions it is useful to know the threshold value starting with which the probability of success is acceptable for considering the project as a promising one (that is, it will raise the required funds). ROC-analysis is used for that, it is closely connected with the logistic regression. A ROC-curve demonstrates the dependency between the correctly classified successful results and the untruly specified unsuccessful choices. The target threshold value is determined on the basis of the

criterion of balance between sensitivity and specificity. Sensitivity (SENS) is the share of truly positive cases which were correctly identified (projects which have raised the required funds are correctly specified), and specificity (SPEC) is the share of truly negative cases (the projects which have failed to raise funds are correctly specified).

### 3. The obtained results

The selection of ICO-projects was obtained with the help of web-scraping and API-sites: icobench.com, icorating.com, ICOBazaar.com, CoinMarketCap.com, icoholder.com and investing.com. It includes 672 projects which completed their ICO-campaigns in the period of 2016–2018. At the same time in 2018 it is accounted for 30% of all projects, in 2017 — 64% and in 2016 — 6%. 65% (432 projects) among the existing 672 projects turned out to be unsuccessful and failed in raising the required amount of money. As for statistics by years, 2018 (the first 6 months) account for 30% of successful projects, 2017 — for 25% and 2016 — for 10%. The number of projects on the market had significantly increased by 2017 but many fraudsters have also appeared. That served as a message that selection of projects has to be more thorough.

Out of the existing projects, a large number of them carried out pre-sale (82%) and a “bounty-campaign” (71%). In total, the given numbers don't surprise us as these two components are the way of attracting investors' attention at the initial stage. Many companies suggested high bonuses on buying at the pre-sale stage. The “bounty-campaign” is also aimed at increasing the project popularity. However, as it was said before, each initiative has its hidden pitfalls.

When we speak about ICO-characteristics of the selected projects, we may note that the largest part of projects (82.5%) set the token price at the level of less than 1 dollar. Using this method, projects tried to attract investors even with limited financial possibilities. Analyzing the duration of an ICO-campaign of the selected projects, we note that 39% of them raise funds within the period of less than 4 months. The number of team members of the selected projects varies from 2 to 67 persons. At that, in 46% it was less than 10 persons. As there has been no profitable business for paying salary not every startup has been able to gather highly qualified staff. The biggest part of projects is related to the blockchain technology (33%) and finances (33%), and also to high technologies (13%) and marketing applications (12%).

Now we will pass over to regression. The correlation matrix of factors is presented in table 1. As it is clear, they almost don't depend on each other and, therefore, the effect of multicollinearity is absent.

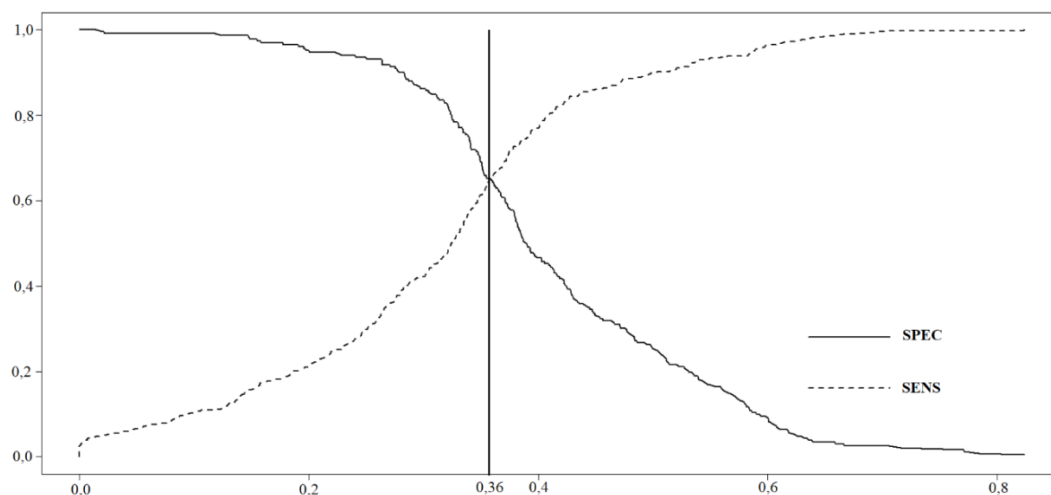
**Table 1.** Correlation matrix of regression factors.

	(1)	(2)	(3)	(4)	(5)	(6)
Pre-sale (1)	1					
Bounty campaign (2)	0.248	1				
Team (3)	0.093	0.145	1			
Hard cap (4)	−0.043	−0.068	−0.06	1		
ICO length, week (5)	0.050	0.024	0.00	−0.01	1	
Price (6)	−0.012	0.049	0.01	0.02	0.024	1

The regression results are presented in the Appendix table 2. The upper number in each square is the coefficient value; the lower one in brackets is their standard errors. Two models have been developed. The first one includes a variable which is responsible for the “bounty campaign”, the second one is not. In both models the pre-sale variable is significant and has a negative sign. Therefore the H.1.1 hypothesis is denied. A possible interpretation consists in the following. Investors accept the contributions at this stage as a “sowing time” and one should be the idea fanatic to risk and invest

money in this period. Meanwhile, many investors are conservative ones. They want to observe the project development and only after that they are ready to invest [17]. Suggestions about the advantages and disadvantages of a bounty campaign were stated before. The variable turned out to be not significant. Therefore, it was excluded from the first model. As for the H2 hypothesis, it was confirmed for H2.1 and H2.3. That is, when managing an ICO-campaign one should set a low price and a short duration. All the factors are significant. The coefficient for the hard cap variable (hypothesis H2.2) has almost zero value and its inclusion in the model requires additional research. Finally, the third hypothesis was confirmed (H3). The presence of a large number of specialists in the team is associated with a higher probability of raising a required amount of money during ICO.

Following the specified methodology, we can determine the threshold value of the success probability. The sensitivity and specificity curves are shown in figure 1. Their intersection point gives the required value of 0.36. Let us note that when other criteria for determining this value are used, other values are possible.



**Figure 1.** Determination of the probability threshold.

#### 4. Conclusions and directions for further research

So, a logistic model of an ICO-campaign regression has been developed in this work and ROC-analysis has been carried out. The choice of factors influencing its success has been substantiated. A selection of 672 projects has been used for their statistical estimation and checking the suggested hypotheses. It has been demonstrated that the probability of raising the required amount of money grows if there is no pre-sale stage, the price of tokens is low, the campaign duration is short and a respectable team of performers is available. The threshold probability of the ICO-campaign success has been found. In total, the results of the work allow token emitters to substantiate managing the success of an ICO-campaign of the project and the investors to see whether it deserves their attention for further analysis.

We will enumerate several directions of further research. Thus, it is quite possible that the specified condition of pre-sale is too severe and it may completely change if other social technologies are applied for attracting investors. What technologies – this issue has to be studied in detail. Another direction is revealing the weight of factors which influence success. Finally, legal framework and application areas of ICO are being developed fast and their specificity has to be taken into account for improving regression models.

## Appendix

**Table 2.** Regression coefficients.

	<i>Dependent variable:</i>	
	output Model 1	output Model 2
Pre-sale (pre)	−1.020*** (0.228)	−0.976*** (0.220)
Bounty campaign (bount)	0.146 (0.201)	
Price	−0.049* (0.026)	−0.049* (0.026)
Week (ICO length)	−0.029* (0.018)	−0.029* (0.018)
Hard Cap (cap)	−0.000*** (0.000)	−0.000*** (0.000)
Number of team members (team)	0.035*** (0.011)	0.036*** (0.011)
Observations	672	624
<i>Note:</i>	* p < 0.1; ** p < 0.05; *** p < 0.01      * p < 0.1; ** p < 0.05; *** p < 0.01	

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