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New Steps in Crypto Crowdfunding and their Related Risks

Presented by: Anis Shami

**Organization: CERAG Laboratory, 150 Rue
de la Chimie, 38040 Saint-Martin-d'Hères**

Date : from 03/03/2020 to from 08/06/2020

Internship supervisor: Ms. Florence Alberti

**Master 2 R
Program: Advances in Finance and Accounting
2019 – 2020**

CERAG

Internship / work-study / research dissertation

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Preface:

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SUMMARY

The recent years have witnessed the emergence of novel innovative fundraising mechanisms with breaking edge technology namely initial coin offering (ICO). Such crypto-crowdfunding mechanism depends on cryptocurrencies and the distributed ledger technology to operate. Such characteristics lead to superior efficiency in fund raising but also jeopardize Investors' interest due to the considerable risk associated.

Due to this critical situation there has been many attempts to produce derivatives or alternatives of the initial method. Types that inherit the innovation of crypto-crowdfunding but not the risk associated. Of such mechanisms, the Initial Exchange Offering (IEO) and Security Token Offering (STO).

While the success determinants of initial coin offering (ICO) were relatively heavy studied by previous literature. The differences between the three crypto-financing types (ICO/IEO/STO) were rarely introduced. In this study we start by describing the emergent phenomena, compare it to conventional financing mechanisms, define the three primary types of crypto-crowdfunding, their strengths and weaknesses.

We subsequently cover the success determinants of ICOs assessed by previous studies. We do so by developing a study matrix that includes the databases used, sample sizes, and the significance level of each variable in each study. After the study matrix is developed, we collect data from multiple online sources to insure data integrity.

When data is collected and cleaned, a sample is selected to conduct an empirical analysis. This analysis includes two key sections. The first includes an assessment of the success determinants of ICOs and a comparison between the outcomes with respect to previous studies' findings. The second section includes an investigation of any possible difference between the three crypto-crowdfunding mechanisms (ICO/IEO/STO).

We believe this study would deliver an absolutely valuable insight of the topic by generating better methodology than that used by previous studies. It is also one of the first studies to test the differences across the divers crypto-financing types.

RÉSUMÉ

Ces dernières années ont vu l'émergence de nouveaux mécanismes innovants de collecte de fonds dotés d'une technologie de pointe, à savoir l'offre initiale de pièces (ICO). Un tel mécanisme de crypto-crowdfunding dépend des crypto-monnaies et de la technologie de registre distribué pour fonctionner. Ces caractéristiques conduisent à une efficacité supérieure dans la collecte de fonds, mais compromettent également l'intérêt des investisseurs en raison du risque considérable associé.

En raison de cette situation critique, il y a eu de nombreuses tentatives pour produire des dérivés ou des alternatives de la méthode initiale. Des types qui héritent de l'innovation du crypto-crowdfunding mais pas du risque associé. Parmi ces mécanismes, l'offre d'échange initial (IEO) et l'offre de jeton de sécurité (STO).

Alors que les déterminants du succès de l'offre initiale de pièces (ICO) étaient relativement lourds étudiés par la littérature précédente. Les différences entre les trois types de crypto-financement (ICO / IEO / STO) ont rarement été introduites. Dans cette étude, nous commençons par décrire les phénomènes émergents, les comparons aux mécanismes de financement conventionnels, définissons les trois principaux types de crypto-crowdfunding, leurs forces et leurs faiblesses.

Nous couvrons ensuite les déterminants du succès des ICO évalués par des études antérieures. Nous le faisons en développant une matrice d'étude qui inclut les bases de données utilisées, la taille des échantillons et le niveau de signification de chaque variable dans chaque étude. Une fois la matrice d'étude développée, nous collectons des données à partir de plusieurs sources en ligne pour garantir l'intégrité des données.

Lorsque les données sont collectées et nettoyées, un échantillon est sélectionné pour effectuer une analyse empirique. Cette analyse comprend deux sections clés. Le premier comprend une évaluation des déterminants du succès des ICO et une comparaison entre les résultats par rapport aux résultats des études précédentes. La deuxième section comprend une enquête sur toute différence possible entre les trois mécanismes de crypto-financement participatif (ICO / IEO / STO).

Nous croyons que cette étude fournirait un aperçu absolument précieux du sujet en générant une meilleure méthodologie que celle utilisée par les études précédentes. C'est également l'une des premières études à tester les différences entre les divers types de crypto-financement.

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FOREWORD

This thesis is developed as partial fulfillment of the master's degree Advances in finance and accounting, at IAE graduate school of management, University Grenoble Alpes France. This master's program is a research-oriented program that focuses on financial markets, corporate finance, banking, insurance, auditing, and accounting fields. The subject of this thesis tackles the new steps in crypto-crowdfunding and their associated risks. A subject falls within the scope of the master's program fields of research. This project is carried out as a part of collaborative work with Cybersecurity Institute, University Grenoble Alpes. It was during an internship period with a target to develop a structured database on such crypto crowdfunding operations.

I have been conducting research on this topic since the beginning of March this year. A period of skills enhancement and refinement. In the beginning, I had relatively little knowledge about such novel funding mechanisms. Presently I am absolutely satisfied by the profound base and experience I developed on such instruments and their functionality.

I am also truly indebted to all those who were a part of this work. Their guidance and orientation remain the keys to making this work possible.

Anis Shami

Grenoble, June 2020

INTRODUCTION

ICO or Initial coin offering is a relatively new innovative way for companies, from startups all the way up to large enterprises, to raise funds. It primarily depends on the Blockchain system through Decentralized Ledger technology (DLT) and it uses cryptocurrencies as a way to collect funds from the crowd. Similar as it seems to conventional crowdfunding, ICO in fact is unique. The difference lies in the project initiators creating and trading virtual crypto tokens (“coins”) in exchange for the funds provided by the contributors.

What makes ICO a special mechanism in fundraising is the low cost generated from being decentralized and regulation-free. This means there are no intermediaries between the investors and the investee. As brilliant as this mechanism may seem, the absence of regulations has provided a window of opportunity for spam and fraudulent projects. Such projects with their deceitful intentions have taken advantage of such a situation and emerged, threatening the interests of investors.

Due to this unsafe situation, new enhanced ways of crypto-crowdfunding came into light with more developed features. These new mechanisms are initial exchange offering (IEOs) and security token offering (STOs).

Through our readings, it was obvious most of the previous literature had focused on indicating the success determinants of ICOs. Existing studies mainly conducted an empirical analysis fetching for variables that might result in an ICO project to fail or succeed. All previous research depended on either one of two methods in their significant testing process. They either determined the success through the funds raised by the project, or they use a regularly updated nominal variable. This variable is obtained from online database sources that explicitly indicates the status of the projects.

We find that the first method, which consists of using the amount raised to determine the success, not suitable. This matter will be introduced further in this paper. The second method, using the nominal success variable, seems more appropriate. Yet it is not properly introduced and utilized by the authors due to the considerably low sample sizes used.

Another problem with these studies is that they rely on a limited number of online data sources. Being obtained from public online available sources, the data used in these studies is questionable.

From another perspective, most of the existing literature has merely introduced these alternative mechanisms (IEOs and STOs) theoretically. Existing studies only determined the difference between these alternative mechanisms, their advantages, and their drawbacks. None of them conducted any empirical significance testing to indicate any substantial advantage of one type over the other.

In the first section of this study, we go further and start by introducing ICOs and their associated risks then we compare them to conventional funding mechanisms. After that, we discover the features of the more enhanced types (IEOs/STOs), their advantages over regular ICOs, and their drawbacks. We then create a comparative study matrix that includes ten papers on ICO success determinants. We investigate the empirical characteristics of each study, we start by specifying the databases used in their analysis. Next, we determine the sample size used, the dependent variable and the independent variables alongside their significance level.

In the empirical section, we try rectifying problems in the methodologies used by previous studies. While most of them collected data by hand. An exhausting, time-consuming, and limiting method. We in contrast collected data from a significantly higher number of online sources and on a notably more substantial number of coins. To achieve this goal, we utilized automated extraction techniques like data mining and scraping. These processes not only reduced the effort and time consumption but also generated a considerably greater number of observations. It is vital to note that the sample used in this study was selected from a larger database on initial coin offering operations. A database that we established during an internship period at CERAG laboratory.¹

After the data extraction is finished a data crossing is performed. It is a method of checking the consistency of the information related to each specific coin across all the databases used. It ensures better integrity and reliability of the data. After this process is performed, we tested the significance of the success factors of ICO projects utilizing a relatively large sample size. We then looked for any significant difference between the three types of crypto-crowdfunding, presented the outcomes, and tried to generate an absolute judgment.

As we declared earlier the novel mechanisms in crypto-crowdfunding (IEOs/STOs) are poorly studied and their comparison to normal ICOs remains theoretical. In this manner, our study will be the pioneer in being one of the few studies to tackle this topic. It would equally be considered as one of the first studies to empirically investigate these innovative techniques. This study also criticized some of the previous studies' methodology in assessing the success determinants of ICOs and provided a potentially more suitable alternative.

¹ CERAG Laboratory: Centre d'Études et de Recherches Appliquées à la Gestion de l'Université Grenoble Alpes (UGA).

PART 1 :
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LITERATURE REVIEW

CHAPTER 1 – LITERATURE REVIEW

In this section, we address various aspects of crypto-crowdfunding from a theoretical perspective by referring to previous literature. We start by defining the initial coin offerings (ICOs) then generating a historical overview of the topic. We then compare them to conventional financing mechanisms. Next, we show the advantages of moving towards such methods. After that, we picture their lifecycle and how they operate. Then we investigate the risks associated with such operations. We subsequently develop a comparison between ICOs and the alternative mechanisms in crypto-crowdfunding IEOs and STOs. Ultimately we create a study matrix of previous studies on the success determinants of ICOs.

I. DEFINITION OF AN ICO

Initial coin offering (ICO), as defined by almost every literature, is a way to raise funds by a mechanism that depends on blockchain technology.² It is performed through the execution of smart contracts.³ A project initiator, who seeks funding, would offer investors (the contributors) coins or tokens in exchange for their money. According to (Li & Mann, 2018) tokens grant their owners the right to use the company's products or services once they are developed (mainly in an unknown time in the future). The key difference between an ICO and IPO, its conventional alternative type of funding, is that ICOs do not offer stocks to the investors. They also do not offer any rights in the institution's or company's assets. According to (Adhami et al., 2018) in their study, why businesses go crypto? They show that tokens grant the contributors the right to access the platform services by a percentage of 68.0%, governance powers by 24.9%, and the right to gain profits after the project accelerates by 26.1%.

(Dell'Erba, 2017) Describe ICOs as a novel and unique form of blockchain-based financing mechanism. New coins are issued on the blockchain and then are transferred to the contributors in exchange for their participation in the project funding in a form of cryptocurrencies. This process is automated and governed by predetermined unalterable computer protocols known as smart contracts. According to (Popper, 2017) in her article in the New York Times magazine She identified ICOs as a way programmers raise money. They do so through the process of creating and selling their own type of virtual currency. Those currencies retain similar rules to those of an early cryptocurrency such as Bitcoin. The issued virtual currencies also denoted as "tokens" can serve multiple purposes.

² Blockchain: A cryptography linked list of blocks. Each block references the previous one using unique hash address and contains information of a financial transaction and a timestamp.

³ Smart Contracts: A Self executing agreement between different parties. the terms of such a contract are predetermined and written in lines of code. The contract is executed when specific criteria is satisfied.

They provide an incentive that encourages investors and developers to invest. It is achieved by compensating them with the right to access the company’s future services.

According to a review from the Duke University of Law (Preston, 2018), most companies do not issue coins or tokens as a form of a new currency (new medium of exchange). They do the issuing with the purpose of achieving funds. It is done by selling these tokens to investors then use the funds collected to develop their stand-alone product.

II. ICO HISTORICAL OVERVIEW

ICOs represent relatively novel funding mechanisms compared to conventional ones like IPOs, Venture Capital, and Crowdfunding. In this part, we present a historical timeline of ICOs. We refer to a table including the Average Duration, Average amount, total number, and Volume in million USD of ICOs. The Table is dated between the year 2013 until the 3rd of October 2019. This table is taken from a report by PWC(PricewaterhouseCoopers) with the title: 6th ICO/STO Report spring edition 2020.

Table 1: ICO Evolution between 2013 and 2019

| Year | AVG Duration (days) | AVG amount (USD mn) | Total number | Total volume (USD mn) |
|-------------|----------------------------|----------------------------|---------------------|------------------------------|
| 2013 | 41 | 0.4 | 2 | 0.8 |
| 2014 | 68 | 3.8 | 8 | 30.5 |
| 2015 | 32 | 1 | 10 | 9.9 |
| 2016 | 39 | 5.1 | 49 | 252 |
| 2017 | 29 | 12.8 | 552 | 7043.3 |
| 2018 | 58 | 12.3 | 1132 | 19689.3 |
| 2019 | 81 | 10.8 | 380 | 4118.5 |
| All | 49.7 | 6.6 | 2133 | 31144.3 |

Source: PWC(PricewaterhouseCoopers) 6th ICO/STO Report spring edition 2020.

It is apparent from the numbers above that ICOs have seen a tremendous increase in number and volume. ICO number increased from 2 to 1132 in 2018. The Total volume changed from 0.8 to 19689.3 million in 2018. Also the average length of ICOs till they achieve their required amounts did decrease from 41 days to 29 days from the year 2013 till 2017. The average amount collected increased from 0.4 to 12.8 million dollars in 2017. From 2017 till the end of 2019 in contrast there has been an increase in the average duration to 81 days. There has also been a decrease in the average amount, Total number, and volume to \$10.8 million, 380, and \$4,118.5 million respectively.

This change can be explained by the fact that crypto markets, in general, have noted a flourishing increase between the end of 2017 and the beginning of 2018. The bitcoin bubble taking place and bursting later that year has led to the change we observe in the table.

We present a timeline we generated from the top ICOs of all time according to the amounts raised by each coin. The data is extracted from multiple online ICO tracking websites such as CoinMarketPlus.com, CoinHolder.com, icoBench.com, Cryptocompare.com, CryptoDiffer.com, FoundICO.com, icoBench.com, icoData.io, icoHolder.com, and icoMarks.com. then the outcome is compared across all sources to make sure the results are accurate and consistent. For the time line see **appendix 1**.

Looking at the top tokens, we observe them being concentrated over the period between Mid-2017 and the beginning of 2018. Clear enough it is the period of the Bitcoin Bubble when the market experienced hype in investing interest in crypto-instruments. Regarding the amounts raised. EOS, a blockchain architecture software or an operating system-like construct upon which applications can be built, comes in the first place with an amount exceeding \$4 billion. Next comes Telegram, a blockchain technology messenger from Telegram, with an amount raised of \$1.7 billion. In the third-place comes Dragon Coin which is a coin used as a currency for casino players who wish to participate at Casinos using Dragon's Blockchain. It collected an amount equal to \$320 million. Huobi coin comes in fourth place with \$300 million. The fifth place is for Hdac, a cryptocurrency, with \$258 million. Then comes Filecoin, pay for storage and transactions in the network service, with an amount raised of \$257 million. Tezos coin, a decentralized blockchain that governs itself by establishing a true digital commonwealth and facilitating formal authentication, collected \$232 million. In the 8th place comes SIRIN LABS the developer of SOLARIN, an ultra-secure mobile phone collecting more than \$157 million. In the last position comes Bancor coin with \$153 million. If we compared these tokens to best the IPOs during the same period, we discover the amounts collected are significantly comparable. According to an article by (Zacks, 2018) the best five IPOs of 2018 collected funds ranging between \$127.8 million and \$733.13 million. This puts ICOs within the competition and makes them an attractive alternative to conventional fund raising mechanisms.

The above ICO projects belong to different categories such as cryptocurrencies, technology, security, platforms, and entertainment. their risk rating ranges between medium and low. Their ICO price ranges between \$0.341 and \$6 and the token supply ranges between 73,853,030 and 2,851,982,500. This huge supply of tokens enables investors with different backgrounds and financial status to invest with as small portions as possible. It gives the projects a higher probability of collecting the required funds.

To compare the two-way possibilities of ICOs evolution over time, we compare the price percentage change of the best tokens compared to five from the group of worst tokens. By worst tokens, we mean the tokens that have collected the least amount of funds with respect to the goal amount. The picking of those tokens is done by operating the identical methods and using the same online sources early mentioned. Next, we present two graphs generated using data obtained from coinmarketcap.com on the daily prices of a group of best and worst ICOs. We must note that the price percentage change was calculated by first subtracting each day's closing price by the initial token prices. The result is then divided by the same initial price, then multiplied by a 100. This process is repeated over the full period for each coin.

When observing the price percentage change, all tokens lose between 30% and 50% of their value during the first month. After that, token prices fluctuate in different directions. Some coins take a downward trend to reach almost 5% of their original price. Other coins experience an upward trend to reach 150% to 200% of their initial value. Some tokens on average keep on their price close to the initial value, see **appendix 2**.

Moving to the worst coins, scam coins or those which never delivered products, services or any kind of value to their investors, the tokens lost between 30% and 70% of their value in the first month then they continued to decrease until they reached a percentage between 0% and 10% of their value, see **appendix 3**.

In both cases above ICO tokens depreciated in price in their first month with a significant percentage. This phenomenon has been mentioned in multiple literature before but had never been explicitly studied nor been empirically investigated. then the value either continued to depreciate or appreciated according to the outcome or the utility generated from the ICO project. Investors may end up losing their invested money without being compensated, or they would achieve higher returns.

III. COMPARISON BETWEEN ICOs AND CONVENTIONAL FINANCING MECHANISM

According to (Popper, 2017) ICO's name was generally inspired by the traditional form of financing the initial public offering (IPO).⁴ Yet an ICO does not provide ownership rights to the public but instead investors are offered tokens. Tokens that represent the right to benefit from the project's forthcoming services or the developed products. The investors can contribute with an amount that might be of small size which attracts more general investors similar to the basic Crowdfunding campaigns such as Kickstarter.⁵ and Indiegogo.⁶

In his paper (Momtaz, 2018) settles the differences between ICOs and other types of conventional funding mechanisms like Venture capital, IPOs, and Crowdfunding. He shows that while different types of conventional funding mechanisms could only be performed in specific stages of the firm's status. For example, Venture capital covers a firm's different stages until it goes public while IPOs are used in achieving high growth capital for established startups. ICOs, on the other hand, could be launched through any stage and with no restrictions.

The repayment that investors(contributors) gain from participating in an ICO is different from that in a Crowdfunding, IPO, or Venture capital. While an investor receives stocks or equity as compensation in exchange for his contribution to the conventional mechanisms. In an ICO a contributor would get Equity shares (security tokens), Product or services, and the right to buy and use them when developed (utility tokens) or a (Cryptocurrency tokens) a Medium of exchange.

ICOs could also be differentiated from other mechanisms by the type of investors that would be attracted or willing to invest in them. These investors are categorized as early adopters, altruistic or selfless, and institutional investors. The investors in ICOs act in a cooperative way since every new contributor would not only benefit himself but the interest of other contributors. So for the project to succeed, more investors are required to participate. These participations are based on financial and non-financial motives. In other forms of financing such as the Reward and equity funding, early adopters and angel investors are more attracted. In the case of Venture capital and IPOs, more sophisticated financial driven investors are attracted (Momtaz, 2018).

ICOs also have another advantageous characteristic that differentiates them from different mechanisms of funding. They are a costless way for project initiators to collect a fair amount of

⁴ IPO: A fund raising method through the selling of a company's equity shares to the public.

⁵ Kickstarter: A Crowdfunding platform founded in 2009. It provides funds for creative projects like films, games, and music to art, design, and technology.

⁶ Indiegogo: An international crowdfunding platform for ideas (creative, cause, or entrepreneurial) founded in 2008.

money due to the close to zero transaction cost. It is accompanied by the absence of heavy documentation and regulations. In contrast, IPOs and Venture capital are highly regulated and could be very costly (Siegel, 2019). According to the report (Considering an IPO? Insight into the Costs of Going Public and Being Public: PwC, 2012), authors showed that the Average cost by the amount raised is considerably high. They provide a table that demonstrates the costs incurred by companies according to the amount of funds they seek to collect. The report showed that on average it costs \$3.2 million to collect less than \$100 million and it goes up to \$8.8 million for raising money above one billion dollars.

The final different point and one of the most important features of ICOs is the 24/7 available trading platforms ensuring higher liquidity through the decentralized network in use. The ability of any investor to close and liquidate his position in the ICO three months after the ICO ends. This is not the case for an IPO where exiting a position could only be available when a specific maturity date is met.

Another well-organized comparison between ICOs and other financing mechanisms was presented by (Lipusch, 2018), to see full Matrix check Appendix 4. He developed a comparison matrix showing similarities and differences between the financing mechanisms. Regarding other types of funding, it was shown that ICOs are similar to Crowdfunding. Both take place in an open call on the web and have a pre-selling. From another perspective, ICOs share the seed funding characteristic with Venture capital. The types of capital seekers in ICOs are new ventures with an idea or proof of concept close to crowdfunding. Yet crowdfunding demands some kind of prototype for the project. Different from IPOs that depend upon a proven track record of the company, ICOs do not need any kind of pre-existing track record. This represents an advantage to startups and new emerging businesses. For the types of capital providers, ICOs' main investors are Developers believing in the technology in use (Momtaz, 2018). Everyone who is driven by the return on investment would be attracted to the other types of funding. ICO investors are hedonic and altruistic similar to those in Crowdfunding but different from the institutional investors in the case of Venture capital and IPOs (Lipusch, 2018).

The Transaction volume is considered to be a bit similar to that of venture capital with an aim to cover all company's costs. Moving to The transaction costs. Similar to crowdfunding, ICOs have low costs due to the direct relationship between the capital giver and gainer. It might even be lower than that of crowdfunding due to the absence of regulations surrounding the mechanism. Talking about regulations ICO is the only type, in this comparison, that is regulation-free. This makes it risky due to no obligation over the shoulders of the project initiators or fund seekers. In the second place comes Crowdfunding with a low level of regulations. Yet regulations do exist with such operation being

under the supervision of the security exchange commission (SEC).⁷ The final point in this comparison is Liquidity. Similar to IPOs, ICOs have high liquidity due to third-party exchanges. Yet it is different from the other types that are distinguished by their low level of liquidity due to limited or no possibility of trading.

we summarize the differences between ICOs and the conventional funding mechanism that we introduced in this section. To view the comparison table, see **appendix 5**.

IV. STRENGTH POINTS OF ICO FINANCING (ADVANTAGES OF MOVING TOWARDS ICOs)

The reason for choosing ICOs rather than any other conventional funding not only depends on the innovative technology of ICOs nor being marked as an effortless way to collect a large amount of money. But also depends on the problems associated with the traditional conventional ways of financing. Being said ICO has mainly become popular because it was a way to overcome those problems in a way or another. In this section we will describe the strength points of ICO and why would a company consider this alternative.

The following are the summarized points, from a combination of multiple pieces of literature for the reasons that would hinder Initiators towards the ICO choice such as (Li & Mann, 2018), (Fisch, 2019), and (Myalo, 2019):

- Decentralization also defined by other literature as disintermediation would efficiently reduce the costs associated with 3rd party intermediary (Advisors, banks, agents...).
- The flexibility of smart contracts and the integrity of the system would replicate the features of traditional mechanisms yet ensure enforceability of the contract execution.
- Absence of regulatory aspects, therefore, lowering commitment, would lead to more innovation which would unleash the full potential of decentralization. It also helps in escaping the excessive expenses a company would suffer if it chooses to raise funds by other conventional mechanisms, like IPO. These expenses are mainly due to the need of complying with the SEC (security exchange commission) standards that might be expensive.
- Due to many external exchanges, secondary market ICO trading platforms, high liquidity is acquired. It ensures an exit opportunity for the investors to liquidate their position providing them with a kind of safe trading atmosphere.
- The alignment between all kinds of investors, miners, and developers in the level of control over the ICO trading. This may create an equal opportunity for all which leads to loosening the grip hold of existing institutional investors.

⁷ Security Exchange commission (SEC): independent federal government regulatory agency created by Congress in 1934. It is responsible for protecting investors, maintaining fair and orderly functioning of the securities markets, and facilitating capital formation.

- Attracting funds from early investors leads to attracting more high-quality contributions from leading developers in the future.
- The open-source project development generates a built-in customer base and a positive network effect.
- The Blockchain technology enables entrepreneurs to build modern innovative services and business models and provides them with direct access to a massive base of investors.
- They Eliminate funding gaps that new startups and SMEs face. It is done by complementing them with the investors from far geographical locations and developing a secondary market for investments.
- There is no need for a track record in order for project instigator to raise funds. Having a track record of previous business operations is a must if initiators wanted to raise funds through venture capital mechanism. This gives the ICOs the upper hand.
- A Low Cost of an ICO relatively to conventional funding mechanisms that would be prone to an extraordinary transaction, regulatory, and Tax costs.

V. THE LIFE CYCLE OF ICOs AND HOW THEY WORK

Before conducting an ICO, two main criteria have to be met. A company or a startup must be willing to disclose all the information related to the project or the business it is willing to undertake. Determine the characteristics of the project to be funded through the money collected by the ICO to investors. This means the company's source code and the business logic are open source and are disclosed to all the contributors. Another criterion, according to (Marshall, 2017), a writer in the blog CoinTelegraph.com, is the ability of the company to deliver a token that generates Utility to the investors in return to their contribution.

An ICO starts with an idea of a project that would generate profit for its initiators. This idea is mainly based on utilizing Decentralized Ledger Technology (DLT). It is performed by developing applications on top of a Blockchain. This mechanism delivers many unique characteristics to the project such as a global reach and equitable opportunity for every user regardless of his background. He benefits from the utilities, profits, or services generated by the project. Neither the less it is equally significant to note that the investors of the ICOs are not only incentivized by the services yet to be achieved. They are also looking to possess their piece of the cake. They invest in the idea and technology that is yet undeveloped hoping it will pay off during the processing period. They mainly speculate on the price of the token significantly increasing at one point of a time at which they will exit their position and gain their reward.

After the idea is developed, according to (Lundy, 2017.) the next step in conducting an ICO would be for the project initiators to put down what is known as a white paper. It is a business plan that includes information about the project such as the sequential stages of building up the project. It is a description of the business idea, the gap or problem that the project will try to solve or facilitate. The solutions the project will provide, a description of the implementation of the token sale and how investors would benefit from holding the tokens. It additionally includes information about the team who is working on the project, detailed overview, and background information of their professional expertise and experience. There are, furthermore, data about the total amount to be raised from the offering, the accepted currencies from the contributors, and the price of the tokens. It considers the existence of a presale, soft cap (minimum amount required for the project to launch), hard cap (the target amount or the maximum limit of the ICO), the platform to be used, date of the ICO, and the number of tokens kept for the initiators. It determines the existence of escrow agent.⁸ How the funds will be utilized, and the plans for the anticipated development of the project. All this information when disclosed represents an indicative signal to persuade investors and generate trust in the project.

A marketing campaign then starts to promote a future product. A product that will be the next success story. They determine it is an advantage for anyone who takes part in this project. For the marketing campaign, initiators would employ any means possible to publicize their project and make it reach as many potential investors as possible. This process is performed primarily through social media (Momtaz, 2018). The initiators first start by building a substantial and reliable virtual ground or reference. Exactly like when any business or company needs to occupy a physical location to start operating, an ICO needs a home, here referring to a website. It would be the ultimate reference for anyone who is willing to invest in the project or is just spectating (Alfred, 2018). This website includes all the information early mentioned in the whitepaper. Yet it additionally includes all the updates on the project, it's status and frequent updates during the development process at every stage. After the website is developed other social media terminals are used such as LinkedIn, Telegram channels, Reddit, Twitter, or any other possible available social network. They are all used to influence the maximum number of potential investors.

After the white paper is finalized and all necessary communication channels have been finalized and are operating, the tokens are then created. They are then put into selling through the initial coin offering. The creation of the tokens can be done through an existing platform, a service for building tokens, or would be built from scratch. The choice of which alternative to be used is surrounded by a

⁸ Escrow Agent: the contractor who binds the ICO fund seekers' commitment to the investors by temporarily holding the funds raised by the ICO.

tradeoff between two factors. The easiness of creation of tokens using the existing platforms Like Ethereum blockchain, but losing some functionality of the tokens created. Or by building the tokens independently and gaining more flexibility and functionality choices that the initiators would like their token to have. Yet it requires more effort, efficiency, and higher development quality level. The project, in this case, is required to build its own private Blockchain.

After all the above decisions and actions are taken, the company decides the price, the time interval for fund collection and the goal amount to be collected. It is then when the coin offering can take place.

According to (de Jong et al., 2018) The coin offering may be of different and predetermined stages. It might have a presale period. This Pre-ICO, which may or may not be conducted, is a way for the project to attract early adopters to fund the project. They would be able to obtain cheaper tokens (Myalo, 2019). Initiators are granted a specified discount on the price of the tokens as an incentive. The main target behind the pre-ICO from the perspective of project initiators is to firstly cover the costs of the upcoming ICO. Secondly, it is considered as an anchor for the new potential investors that would be more attracted to the ICO during the public offering later. From the perspective of investors, a pre-ICO would also help with the assessment of the actual price and value of ICO tokens during the public sale. So it is clear the price in a presale is substantially cheaper than that of the public sale period.

After the pre-sale ends a public ICO takes place, the duration of the ICO may take days or less, others take more than a year. Yet there is a movement towards standardizing the ICO markets with some requirements. The platform used in ICO is mainly Ethereum blockchain under the (ETH-20) standard.⁹ It is used because of the ease of creation, high efficiency, time reduction, and relatively low technical knowledge requirements. Other platforms might be used as well such as bitcoin blockchain, waves, or the project's own private blockchain. The project initiators would create a virtual wallet that refers to a specific address. An address where the investor's funds will be accumulated. The currencies accepted vary from one project to the other but in general, the main payment methods are executed through cryptocurrencies (Bitcoin/Ether). The investor would use a third-party exchange to buy the cryptocurrencies then trade them on the platform in exchange for the tokens. In this triangular process, an investor would exchange some fiat currency into cryptocurrencies through a third party exchange early mentioned. Then the cryptocurrencies bought would be used to contribute to the initial coin offering. The investor might also buy tokens directly

⁹ETH-20: A commonly used smart contract standard which is implemented on Ethereum blockchain.

using digital fiat currencies like using Visa or MasterCard payment methods if the project accepts these types of payments.

After the ICO ends there are different possibilities. If the ICO does not reach its minimum required funding goal (soft cap) the investors will be directly refunded. If it does collect the required amount the ICO will be considered successful. The project initiators will receive the funds and in return, the investors will receive their tokens. Yet the trade does not end here since tokens may still be traded in a secondary market exchange. Tokens that would be listed in that exchange would acquire higher liquidity therefore providing the investors with anytime exit opportunity. This liquidity is considered the fundamental reason for inducing many investors. It also hinders the possibility of bidding on the price change of the tokens, therefore, taking a Speculative approach.

For a token to be listed in one of many secondary exchanges, it sometimes does not require specific criteria. Yet some other exchanges require some prerequisites to be disclosed and achieved. The description of the token, a symbol for the project, the team members working on the project, the time of the ICO, and Pre-ICO if applicable. Also links to the project website, social media platform, and GitHub repository. As long as the token is still listed in the exchange, it is still active thus the project is still operating. The ICO ends only when it is delisted. We present in **appendix 6** an infographic picture by (Wang, 2017) that represents the lifecycle of an ICO.

VI. ICOS AND RISK

Generally speaking, ICO is considered a risky investment. For this reason, it has been banned in different countries like China on the 4th of September 2017 and South Korea in the same month. It was announced so due to the lack of stability and the ease of manipulation in such operations. They were banned immediately, and all the previous projects were to refund their investors or face severe consequences by the law.

According to (Momtaz, 2018) there are different types of risks an ICO may incorporate. The depreciation in price is the most commonly known. In this case, the value of an ICO depreciates after the product is launched. This is due to the fact that the majority of investors buy the tokens to achieve a fast profit in the first place. According to (Adkisson, 2018) when the token takes a long time to appreciate, many investors would prefer to sell their tokens in the secondary exchange. This will lead to a disequilibrium in the demand and supply. The supply will overtake the demand leading to a depreciation in the token's value with a specific ratio. Due to what is called herding behavior¹⁰, more investors would prefer to escape and save as much value as possible from their portions in the

¹⁰ Herd behavior: A systematic and collective behavior of individuals in a bigger group towards a specific Unconscious decision.

tokens. They do so before things get worse leading to a snowball effect which results in higher losses in the token's price.

According to (Lahanjar et al, 2018) the token gains more value when the number of participants joining the platform increase. The secret behind retaining an increasing trend in the value of the tokens lies in the "wisdom of the crowd" according to the author. That is when participants take a collective decision to keep their tokens and wait for a longer-term return instead of cashing out early. This is defined by Nash equilibrium; it is either everybody wins big or none of them do.

Another problem is described as the investors' hesitation. It is generated by the confusion of investors when deciding to invest in a specific token. They wonder if there will be enough other participants that would join the project. They always keep in mind that a higher return is mainly associated with more investors joining the club.

Fraudulent projects. It is when initiators try to faulty convince investors that they have a legitimate project to get the funds. Scams, on the other hand, are the multiple techniques and forms used by scammers to obtain money from investors in the case of ICOs. They include emails, telephones, text messages, or social media. In the case of ICOs, a scam might be implemented without the need to create an ICO project. It only requires an image copy of an HTML website page of any existing project. This page is hosted on a server with a different Hash address where the scammer can receive the funds.

The previous two types are potential risks that an investor may fall into especially that the fund transfer is done through an anonymous based transaction. Money may be sent to an unknown person whose real identity could not be tracked. Also, the insufficient amount of information provided by the ICO would lead to considerable potential for fraud. According to (Sender, 2018) in an article in the wall street journal, the absence of legislation may also act as a potential driver for some developers to launch a false offer or tokens. It is, in addition, the lack of security standards adopted by ICOs that would lead to successful hacker's attacks. The Authors observed through a study to 1450 coins by analyzing their whitepapers that 271 raised red flags including different indications of fraud. Of the indications are plagiarized investor documents, false executive teams, and promises of guaranteed returns. According to the authors, investors' contributions in those 271 projects reached a total amount exceeding \$1 billion. \$273 million were reported as losses at the time of the study. The authors have gone further to analyze various aspects that eventually led to characterizing the projects as suspicious or fraudulent. The outcome of the study showed a 111 project having the repeated sections "word-by-word" in their whitepaper. 124 faked or concealed team members, 48 projects have no websites and 25 projects promised guaranteed return. Further in **appendix 7** we

represent common pictures of some people used as team members in some of those fraudulent projects.

In another study by (Sherwin, 2018) they found 78% of ICO's were Identified Scams, approximately 4% Failed, and the ones that had Gone Dead were almost 3% and approximately 15% went on to trade on an exchange.

The Market of Lemons discussed by (Akerlof, 1978) may be caused by the Information asymmetry in ICO markets. It leads to a positive bubble in the ICO market according to (Guillermo, 2019). It may also cause a fire sale of the tokens which leads to a loss in price. Loss a project may sometimes never recover from. According to (Fisch, 2019) Because ICOs are ventures of a preliminary stage they are accompanied by High information asymmetry.

Tokens do not provide any type of ownership to the investors. It additionally does not provide them with voting power. This leads to a lack of corporate governance which may affect the maturity and health of the project. It is explicit that in an ICO, with tokens of Utility type, the project initiators convey endless freedom in how they utilize the funds obtained from the ICO. Plus, there are no restrictions on how they would operate. For example, there is no control over how much money they would consider as a compensation for the work they put in the project. They would also be capable of misusing the funds causing moral hazard.

Another problem would be the weak technical background of project initiators, the empire builders, or those with inadequate ideas. Even fragile management could represent the reason behind an ICO ultimately failing.

The Long time frame of a project according to (Lahajnar et al, 2018) would culminate in the emergence of an innovative competitive product. A product that will prevail the market. Knowing that many projects have their business model and source codes available to the public and are open-source. This way it is relatively effortless for any developer to build a similar more enhanced project which maybe would dominate. There are many controversial stories of data breaches in private only source code companies. According to (STAHIE, 2020) Nintendo, a company specialized in manufacturing gaming consoles, has recently experienced Source Codes online leak to their Wii, N64, and GameCube. Such source code theft happened even though it was adequately protected. So ICO vulnerability lies in the no-restriction to source code and business plan being public.

There is, moreover, risk related to the unknown outcome of a project. Investors place their money at stake without knowing whether the project will generate a functional product eventually or not. Other frequently identified risks are the risk of non-completion of the project. Quality and

product risk. Organizational risk due to poor leadership and management, lack of experience and knowledge. The poor human capital and fake profiles.

The unpredictability of Regulation's potential future outcome risk. It is one of the most common types of potential risks an ICOs might encounter. Until now there have been no solid, common, or clear regulations put to manage and handle the ICO operations. At that time when such issues are agreed upon, ICOs would be prone to an increase in transaction and taxation costs. The anonymity issue surrounding ICOs will also rise with the emergence of the Security exchange commission (SEC) rules and standards that an ICOs may potentially have to comply to.

In fact, the general problem lies in the fact that ICOs depend on the cryptocurrency market with its volatile nature. According to (Bucko et al., 2015) because the cryptocurrency is not usable outside the electronic environment, the trust in such currencies might be limited. It potentially would not achieve the necessary levels before the bubble bursts again.

VII. ICOs, STOs AND IEOs.

In this part we will describe in detail the crypto-crowdfunding three types. We will additionally provide some insights about their differences and similarities. We will also try to assess the benefits and drawbacks of each type relative to risk and success. Then in the coming empirical study, we will try to investigate the theories that will be introduced in this part.

After the emergence of ICOs, the projects with Utility tokens that are traded on their own platform, Many issues were discovered. Mainly but not exclusively, the risk related to investors contributing to the funding of those projects then losing a substantial amount of their invested money. With no strings attached, the instigators hold no responsibility for any kind of losses those investors may suffer. For this reason, there has been a movement towards more reliable and trustworthy methods that would mitigate the risk associated.

According to (Myalo, 2019) DAICO, IEO, and STO where the potential ways to deal with these issues. Decentralized Autonomous Initial Coin Offering (DAICO), in general, remains a way to deal with the manipulation that may occur in an ICO sale. It is implemented through the strict smart contract regulated terms. It prevents the initiators from cashing out all the funds they receive from investors directly. It gives the investors more control over the amount of money to be provided to the project. The money is split into multiple portions that are provided to the instigators in multiple stages. This provides investors with more security. DAICO produces also various advantages. It is an interesting enhancement to normal ICOs, yet it is not within the scope of this study. We will Next move to IEOs and STOs which will be later assessed in the empirical section.

A. Initial Exchange Offering (IEO)

Initial exchange offering (IEO) is similar to a normal ICO, yet the only difference lies in the fact that IEOs are traded through an external or third-party exchange. This exchange becomes the terminal in the supply chain of the projects. It can also be considered as a marketing partner. The investors in this exchange would be verified by the exchange which can be the main difference deviating IEOs from ICOs.

To describe what differences and advantages an IEO brings to the table we provide some specific rules or standards a project launching in an exchange must fulfill. According to (Golubyev, 2019) there are some prerequisites or conditions a project needs to obey before being traded. Firstly, the project must be verified by the exchange since the exchange puts its reputation on the line with every IEO project it launches. According to (Bunduchi, 2008) "a failure of an exchange with a specific customer will be noticed by other customers and each service failure will contribute to decreasing the customer's trust".

For the project to be verified initiators should disclose more nourishing and high-quality information. Information similar to that disclosed by a high standard and successful ICO. The importance of an IEO is that the exchange would look into the information, access, and analyze it. It may even require further information if necessary. The exchange may even turn down a project if it does not fit the standards. This method of verification provides investors with a more secure investment atmosphere. Another advantage for investors is that they do not need to create a special wallet for holding the tokens. They can use their existing wallet (the one they use to trade on this exchange or have been using in their previous transactions). Also, the purchase procedure is simple, all the investors need to do is wait for the tokens to be put on sale then place their orders.

One more advantage IEO investors may have is the constant price associated with the token regardless of the time of purchase. This means that early adopters who are the first to buy and invest in these tokens would be safe. They would not experience any depreciation in the token price after the purchase. Yet they would be offered exclusive early access to the product or service once it becomes functional. They may also be offered bounties like additional free tokens.

IEO has its own advantages from the perspective of the project initiators themselves. It makes the listing of the tokens easier and faster. It indeed provides more reasonable costs for listing in comparison to the listing of the ICO token in a normal cryptocurrency exchange. Being listed as an IEO a project token sale may undergo hours or even less to be sold out in the initial sale. Whereas in a normal ICO it may accompany several days on average to complete the sale.

From a financial perspective, a token distributed as an IEO possesses a more considerable value than that being traded on primary distribution. This can be explained by the higher demand a token may experience in comparison to that of normal ICO.

It is significant to mention the disadvantages of an IEO as well. For example, the marketing costs of an ICO are no more included in the project's business plan. It was initially a way to gain more money from investors by providing sometimes exaggerated marketing costs in the project description. Also, the fact that many exchanges do prefer not to list IEOs for many reasons. Their unwillingness to experience the side effects of a project turning out to be a scam or fail. Another reason would be the exchanges preferring to get rid of all the extra work they have to do when listing an IEO. It is the heavy verification and investigative work they want to escape. Also fleeing any burden, they might hold from future regulations if they were to be put into action.

B. Security Token Offering (STO)

The main reason behind the emergence of an STO is the problem arising from normal ICOs. The fact that they do not provide any compensation to investors in case of failure of the ICO. The nature of Utility tokens makes them only provide products or services when they prevail in a specific time in the future. They do not provide any kind of obligation or commitment from initiators towards investors. They also do not create any rights for the investors in the project's assets.

Security tokens offerings (STOs), according to (Ante & Fiedler, 2019) are "regulated securities in the form of Blockchain tokens", it is the offering of tokens that represent capital rights to investors in the project. This does not exclusively tie these tokens to shares of the project, but it does provide the investors with other alternatives of ownership and control. These tokens may provide their holder with dividends, cash flows, Voting rights, and repayment of debt. All those rights are guaranteed, and their integrity is ensured by the smart contracts.

The advantages of STOs over normal ICOs, according to (Myalo, 2019), are that they provide more information transparency. They reduce information asymmetry, making the project team more responsible towards investors. It protects them by determining eligible investors through the Know your customer process (KYC) and anti-money laundering forms (AML). It also helps reduce the probability of fraud. It protects the rights of investors in the case of the project's bankruptcy.

It provides control for the investors by giving them monitoring control over the behavior of the project team. It insures them with the right to vote against some decisions that would lead to risking their invested money. It even gives them the right to file a complaint to the appropriate authority which can take action. thus the project team can be considered liable for the disruption of the project and the misuse of investors' funds.

What is seen in STO is that it has all the advantageous characteristics of ICOs accompanied by little protective enhancements. This would lead to the perfect funding instrument. Even though it may seem perfect from the perspective of investors, it comes loaded with many new problems. Issues that limit the effectiveness of those unique characteristics. Actually the factors that are considered to be the strong points of STOs over the normal ICOs also act as chains in the hands of the project initiators. Such factors limit the power of such instrument in being the last resort of such projects to see the light.

Here we present the issues or disadvantages of conducting an STO. According to (Momtaz, 2018) They generally have to comply with the SEC regulations. They are subject to tax reporting, more information disclosure, and many other restrictions that would lead to an increase in the cost of using them to raise funds. On the other hand, not complying with these regulations would potentially lead to serious sanctions. One example of such a problem is Basis token. It is a project announced failed by the initiators after struggling and not being able to escape the SEC potential security regulations as they reported on their website Basis.io.

After the examination of the regulatory aspects of STOs and the problems they face, as a result, we provide the reason behind them being considered as securities. When categorizing financial instruments, a test is conducted to determine whether the instrument is used for consumption or investment purposes. When the instrument is categorized as being for consumption use, then it does not fit to security characterization. Therefore, it does not have to comply with SEC regulations. In contrast when the goal of holding the instrument is a pure investment, then it must comply with these regulations. This puts a kind of heavy burden on the project using this instrument.

In order to test this hypothesis (An instrument is a security, then it is an investment.) it must pass the Howey's test. A test named after a Law suit case between the Security exchange commission and Howey Corporation. A law suit that concerned whether a leaseback agreement was legally an investment contract (SEC.Gov | Framework for "Investment Contract" Analysis of Digital Assets, 2019).

Howey's test is made up of four factors or questions.

- Is it an investment of money (By the money we mean cash or assets)?
- Is the investment made in a common enterprise?
- Is there any profit that comes from the promotion of a third party?
- Are there any expectations of a profit being generated from holding the instrument?

According to this description, security tokens cannot but fit into Howey's test, therefore be forced to comply with the regulations of SEC and treated as normal securities. This is the worst

nightmare project instigators try hard to escape from when issuing tokens. It is due to the excessive costs associated with the process plus the amount of information they have to disclose. There is even a more critical issue in the mandatory know your customer (KYC) restriction that obliges the project to identify the participants and the contributors in the token offering. This contradicts the leading idea ruling the Blockchain characteristics which is anonymity.

There are different mechanisms that project initiators try to use in order to get exempt from the severe costs associated with regulations. Costs incurred if they were to comply with SEC's standards. Badly enough the rules required by an ICO in order to be exempt are hard to apply and limit the efficiency of STOs considerably. Until now there has been no solid decision to regulate the coin offering. For this reason, projects use ICO, IEO, or STO to raise funds. They choose them because of the time efficiency and low costs associated. Definitely, they represent a substantial risk to investors, but they are already compensated by the cost reduction they achieve when using these mechanisms. A lower-cost compared to that incurred when raising money, the old conventional way. Cost of IPO ranges between \$4 million to \$28 million in fees (PricewaterhouseCoopers, 2017).

There is another problem that arises from providing a voting control to investors in an STO. Investors presently assert the right to intervene with any technical decisions a project may take. They would choose protocols that maximize their own wealth regardless of the adverse effects that the project may suffer. It is equally possible that competitors would buy tokens in the project to participate in voting. They would help to make decisions that may harm the project or cause it to underperform so that they would prevail.

VIII. PREVIOUS STUDIES

In this section we provide results of Ten previous studies published in leading journals such as: Journal of Economics and Business, Journal of Business venturing, SSRN Electronic Journal, Springer Science and Business Media, Venture capital Journal. Some other studies were presented in conferences like the fortieth International conference on information system Munich 2019. All these studies observed and tested the significance of success determinants of ICOs. The papers sought various goals. Some of them tried carrying out a general assessment of the success determinants of ICO projects. Other papers tried to analyze specific variable effect on the ICO success in presence of other variables. The papers adopted diverse approaches through their analysis. Some used linear regression with the amount raised by the project as the experimental variable. We find this approach inconvenient which will be discussed later in our empirical section. Other studies used non-parametric significant testing in their analysis.

We are interested in the comparison between the outcome of success determinants' significance obtained by previous literature and the results that we will obtain later by our empirical testing. In the two tables further down we determine the ten studies' numbers, titles, authors and years. And a summary of the variables studied and their significance level. The Levels are distributed as follows:

- NS: Not Significant
- PS: Poorly Significant
- S: Significant
- HS: Highly Significant

For More Detailed Overview of the studies see Study Matrix in **appendix 8**.

The Results generated from the various studies show much contradiction. The variables are separated into three key sections. A Not significant, slightly or highly significant, and one last section showing a varying status. This section has a combining range of outcomes from being Not significant to being Highly significant according to the study.

The Patent, Token Price, Token governance, Token contribution, Fintech, Sector, Restricted Areas, voting rights, Gender, Minimum Contribution, and verified advisors all showed No significance in relation to the success of an ICO.

A second group containing Duration, Fiat Currency, Token supply, Location, Team number, Verified Team members, Team Background, Market sentiment, Vision, GitHub Pre-ICO, Ln(SoftCap), Ln(HardCap), ICOVolume, Number of Advisors, MVP/Marketing, Social Media, Telegram, Escrow Agent, Expert ICO and Market Place exchange showed poor to high significance.

Table 2: Number, Title, Authors and years of previous studies

| Study Number | Title | Author | Year |
|--------------|--|--------------------------|------|
| 1 | Financing FinTech Projects: An exploration of the Determinants of Success of Initial Coin Offerings | Andrea Moro | 2018 |
| 2 | Are Blockchain Crowdsales the New "Gold Rush"? Success Determinants of Initial Coin Offerings | Ryan Amsden et al | 2018 |
| 3 | What Makes an ICO Successful? An Investigation of the Role of ICO Characteristics, Team Quality and Market Sentiment | Lauren Burns | 2018 |
| 4 | ICOs success drivers: a textual and statistical analysis | Paola Cerchiello et al | 2018 |
| 5 | Initial Coin Offerings | Paul P. Momtaz | 2018 |
| 6 | Why do businesses go crypto? An empirical analysis of Initial Coin Offerings | Adhami et al | 2018 |
| 7 | Initial Coin Offering (ICOs) Determinants of successful Initial Coin Offering (ICOs) | Diogo Filipe Barros Cruz | 2019 |
| 8 | Initial coin offerings (ICOs) to finance new ventures | Christian Fisch | 2019 |
| 9 | What an Investor Wants; What an Investor Needs: Identifying Deceptive Projects on Blockchain Market | Eunhee An et al | 2019 |
| 10 | What determines success in initial coin offerings? | Roosenboom et al | 2020 |

Table 3 : Success Determinants of ICOs

| Study Number | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Variable Description |
|-----------------------|-----------------------|----|----|----|----|----|----|----|----|----|-----------------------------------|--|
| Dependent Variables | Success | T | F | F | T | F | T | F | F | F | F | Nominal Variable (Success or Failure) |
| | Amount Raised | F | T | T | F | T | F | T | T | T | T | The amount raised by Project (Scale) |
| Independent variables | Patent | x | NS | x | x | x | x | x | NS | x | x | Application & Project License |
| | Duration | x | x | x | x | HS | x | PS | HS | x | HS | Public Sale Duration |
| | White paper | x | HS | x | HS | x | NS | NS | HS | HS | x | Existence of Whitepaper |
| | programming code | HS | NS | x | x | x | HS | x | S | x | | Source Code Quality |
| | Presale | HS | HS | NS | x | PS | HS | PS | NS | x | S | Existence of Pre-sale |
| | Bonuses | NS | NS | x | x | x | NS | NS | x | NS | S | Existence of Pre-sale |
| | Accepted currency | x | NS | x | x | NS | NS | x | x | S | NS | Accepted currencies by project |
| | Fiat Currency | x | PS | x | x | x | x | x | x | x | PS | Project accepts electronic bank payments |
| | Token Supply | x | HS | x | x | x | x | S | HS | x | HS | Number of Tokens for sale |
| | Token Price | x | x | NS | NS | x | x | x | x | x | NS | Price of a Token |
| | Token service | x | x | x | x | x | HS | NS | NS | x | x | Token Subscription to service |
| | Token governance | x | x | x | x | x | NS | NS | NS | x | x | Token provides investors with control. |
| | Token profit | x | x | x | x | x | S | NS | NS | x | x | Token generated dividends |
| | Token contribution | x | x | x | x | x | NS | x | x | x | x | Minimum number of Tokens per investor |
| | Jurisdiction | S | x | x | x | HS | S | HS | x | NS | x | Laws governing the work of the project |
| | Fintech | x | x | x | x | x | NS | NS | x | x | x | Financial Technology project |
| | Platform | x | S | x | x | PS | NS | NS | S | S | NS | The Platform used by Project |
| | Smart contract | NS | x | x | x | x | x | PS | x | x | x | Available Smart Contracts |
| | Location | x | x | x | x | x | x | PS | S | | x | Project's Initiation Location |
| | Sector | x | x | x | x | x | x | NS | NS | NS | x | Industry of the project |
| | Team number | x | HS | S | HS | x | x | PS | x | PS | HS | Project 's Team number |
| | Verified Team members | x | x | x | x | x | x | x | x | S | x | Team Membered verified |
| Team Background | x | x | HS | x | HS | x | x | x | x | x | Project Team expertise/experience | |
| Market Sentiment | HS | x | PS | S | S | x | x | S | PS | x | The Social Media Sentiment | |
| Vision | x | x | | x | S | x | x | x | x | x | The Goals & Targets of Project | |
| ICO profile | x | x | | x | PS | x | x | x | x | x | Profile of ICO (Website) | |

| | | | | | | | | | | | Profile) |
|------------------------|----|----|----|----|----|----|----|---|----|----|--|
| KYC/Whitelist | NS | NS | S | x | HS | x | x | x | HS | x | KYC/Whitelist exist |
| Ethereum return | x | HS | x | x | x | NS | x | x | x | S | Return of Ethereum |
| Ethereum volatility | x | NS | x | x | x | NS | x | x | x | HS | Volatility of Ethereum Coin |
| GitHub Pre-ICO | x | x | x | x | x | x | x | x | x | HS | Existence of GitHub repository in Pre-ICO |
| Token retention (%) | x | PS | x | x | x | x | S | x | x | NS | Retention rate of Tokens by initiators |
| Ln(SoftCap) | x | S | x | x | x | x | x | x | x | x | Ln transformation of Soft Cap |
| Ln(HardCap) | x | x | x | x | x | x | x | x | x | HS | Ln transformation of Hard Cap |
| ICO Volume | x | x | x | x | x | x | x | x | x | HS | Number of Traded Tokens |
| Number of Advisors | x | HS | x | HS | x | x | x | x | S | x | Number of Advisors in projects |
| Verified Advisors | x | x | x | x | x | x | x | x | NS | x | Advisors are Verified |
| MVP (Prototype) | x | x | x | x | x | x | x | x | HS | x | Prototype to the project exists |
| Marketing Social Media | x | HS | x | x | x | x | x | x | HS | x | Number of Social Media Marketing platform |
| Minimum Contribution | x | NS | x | x | x | x | x | x | NS | x | Minimum Contribution by Investors. |
| Telegram | x | x | x | S | x | x | x | x | x | x | Telegram Channel exists. |
| Escrow agent | x | x | S | x | x | x | x | x | x | x | 3rd Trusted party exists. |
| Expert CEO | x | x | S | x | x | x | x | x | x | x | Existence of experienced CEO. |
| Gender | x | x | NS | x | x | x | x | x | x | x | Female Team Members exist. |
| Marketplace exchange | x | x | x | x | x | x | S | x | x | x | Accessibility of project in secondary exchanges. |
| Voting rights | x | x | x | x | x | x | NS | x | x | x | Investors have voting rights to project decisions. |
| Restricted Areas | x | NS | x | x | x | x | x | x | x | x | Areas where a project is banned. |

PART 2
-
RESEARCH METHODS AND SAMPLE

CHAPTER 2 – OUR RESEARCH METHODS AND SAMPLE

In this section we describe the research design and the different stages of our empirical research process. The study starts by Data collection from multiple online sources. After that a harmonization and crossing between the data acquired from the multiple sources is conducted. When the previous process is done, various variables are chosen to conduct the empirical analysis. The empirical analysis follows two paths. The first is to assess the success factors of crypto-crowdfunding, and the second is to investigate any significant difference between the three different types of crypto-crowdfunding. We will provide a more comprehensive description of each stage through a flowchart in the **appendix 9**.

I. DATA COLLECTION

In order to conduct an empirical analysis of ICOs, STOs, and IEOs. Their success determinants, and whether there is a significant difference between the three groups, we collected data from different online public available data sources. It was necessary to collect data from different sources in order to ensure data integrity and reliability.

In total the number of online sources used was 20 including CoinCodex.com, CoinDesk.com, CoinHills.com, CoinMarketCap.com, CoinMarketPlus.com, CoinTelligence.com, CryptoCompare.com, CryptoDiffer.com, FoundICO.com, icoBench.com, icoData.io, icoRating.com, icoHolder.com, icoHotList.com, icoMarks.com, InitialCoinOfferingList.com, TokenData.io, TokenMarket.net, TopICOList.com, and TokenTops.com. All those websites are private websites specialized in crypto-instruments tracking.

For the Data Extraction and collection, we utilized multiple tools to automate the extraction especially that a by-hand extraction process craves a considerable amount of time and effort. We started the extraction by using Eclipse JAVA IDE to execute a small code that will systematically fetch into HTML elements and containers in the ICO listing websites. It then collects the data and stores it into an excel file.

This technique worked fine for websites with a static HTML nature where data are stored in HTML containers like Tables or Lists. But when moving from one website to another, even when navigating through pages of one website with dynamic elements, the code has to be readjusted every time to fit the situation. This process required a considerable amount of time. Each website sitemap had to be studied in addition to knowing the distribution of elements and where each data is stored to do the extraction.

As a way to facilitate the work and make it more efficient and to extract a larger amount of data, we used other tools like web scraping tools and data miners. Those methods will make the operation easier and faster. It is done through the creation of sitemap loops that in addition to fetching HTML elements, will operate and trigger some dynamic elements on specific pages to reach the desirable entities. It then deposits them in their appropriate attributes. In some websites with changeable records and collapsing containers, records had to be extracted along with their titles all concatenated in order not to overlook any detail. Also to prevent the information from being wrongly mixed up together, data had to be cleaned, restructured, and organized to be ready for use.

The observations or coin records extracted are presented in the table below. The total Number of records is 41,382. This number contains redundant fields of almost every single coin. In our analysis, we selected a random sample of 1055 coins with values crossed over all the databases from which the data are extracted.¹¹ The crossing of the data is performed using SQL management studio by combining and sorting all the records together. It is achieved by grouping common coin records together with the coin's name used as an identifier.

The crossing of data previously mentioned represents a way to ensure data integrity. The data from a single database is unreliable enough. Through in the crossing process we encountered differences in the data relative to some coins. For example, the amount raised by a project was sometimes different according to the database. In general, there existed significant consistency across records. The crossing is performed manually and by hand for more than 8,000 records. Initially, we observed each variable in a coin's record and made sure it was consistent across the multiple redundant records generated from the database crossing.

Coins with only one record were immediately eliminated from the sample, coins with only two but contradicting records were also eliminated from the sample. The exclusive way to validate the coin's data consistency and integrity is a minimum of two out of three redundant records existing for the same coin record group. In the case of a coin with multiple records containing contradicting data the value selected is the one with the maximum number of similar occurrences.

After we completed the extraction and the processing of our sample we noticed that the number of STOs was only 20, and that of IEO was 32. This number is significantly low in comparison to the total sample number of 1055 coins. We believed it is not significant and not reliable enough to determine the difference among the three groups with such sample variation.

¹¹ Databases Crossing: Unify the structure of the tables extracted and create one large dataset that includes all the different variables with all its adjacent records.

Table 4: Sources & Total number of Extracted Records

| Database Name | Number of Observations |
|-------------------------|------------------------|
| CoinCodex | 2,487 |
| CoinDesk | 861 |
| CoinHills | 2,526 |
| CoinMarketCap | 2,176 |
| CoinMarketPlus | 1,383 |
| CoinTelligence | 931 |
| CryptoCompare | 1,484 |
| CryptoDiffer | 575 |
| FoundICO | 3018 |
| ICORating | 5112 |
| ICOBench | 5,672 |
| ICOData | 2,048 |
| ICOHolder | 6,534 |
| ICOHotList | 416 |
| ICOMarks | 101 |
| InitialCoinOfferingList | 1,684 |
| TokenData | 2,381 |
| TokenMarket | 1,114 |
| TopICOList | 244 |
| TokenTops | 635 |
| Total | 41,382 |

To resolve this problem, we extracted more data on STOs and IEOs from other websites. We completed the crossing for IEOs and STOs then added the second dataset to our original sample to perform the significant testing and to obtain more reliable results.

We extracted the new dataset practicing the same previous methods. The sources are websites specialized in IEOs and STOs or have sections only specialized in those two types. The websites are the following: CoinSpeaker.com, ICOHolder, STO-List.com, and TopICOList.

Table 5: IEO & STO Additional Records

| Database Name | Number of Observations |
|---------------|------------------------|
| CoinHolder | 156 |
| CoinSpeaker | 126 |
| STO-List | 50 |
| TopICOList | 16 |

The preceding table contains the additional STO and IEO coins extracted after the crossing has been made employing the same previous method. We ended up with 76 additional coins. The recent number of STOs became 86 coins, and that of IEOs number became 42. It is True this was not a

substantial increase. Yet it is important to note that IEOs and STOs are relatively new compared to ICOs. For this reason, it is hard to recover and obtain a sufficient amount of data on those two types.

II. VARIABLES

The following table includes the Variables used in our analysis (Names, Types, and Description).

Table 6: Variables Names, Types & Description

| Section | Variable Names | Variable Type | Description |
|------------------------------|------------------|---------------|--|
| ID | Name | String | Name of the ICO |
| General Information | Ticker | String | ICO Symbol |
| | Category | String | The Industry or the project type of the ICO. |
| | ADJ Category | Integer | Adjusted Category of the project Industry type (1- Education & Health Care / 2- Technology & AI / 3- Business & Financial Services / 4- Real Estate & Manufacturing / 5- Entertainment & Media / 6- Charity) |
| | Country | String | Country of origin the ICO project |
| | Description | String | A brief Summary of the ICO Project (Introduction) |
| | Location | Integer | Adjusted Location or origin of the ICO project (1- America / 2- Europe / 3- Asia / 4- Africa / 5- Australia) |
| Time | Pre ICO Start | Date/Time | The Start date of the Pre-ICO sale |
| | Pre ICO End | Date/Time | The End date of the Pre-ICO sale |
| | Start Date | Date/Time | The Start date of the ICO main sale |
| | End Date | Date/Time | The End date of the ICO main sale |
| | Pre ICO Duration | Float | The Pre-ICO Duration (Computed) |
| | Duration | Float | The ICO Duration (Computed) |
| Technical Information | Platform | Integer | The Platform and the Blockchain used by the ICO (Dummy 1- Ethereum / 2- Other) |
| | KYC | Integer | Know Your Customer form to investors (Dummy Variable 1- Yes / 2- No) |
| | White List | Integer | Whitelist of the investors exists (Dummy Variable 1- Yes / 2- No) |
| | White Paper | Integer | Whitepaper of the ICO project exists (Dummy Variable 1- Yes / 2- No) |
| | Token Type | Integer | Token Type ICO, IEO, STO (1- ICO / 2- IEO / 3- STO) |
| | MVP/Prototype | Integer | A Prototype Exists for the ICO project (Dummy Variable |

| | | | |
|------------------------------|----------------------------|---------|---|
| | | | 1- Yes / 2- No) |
| | Team Number | Integer | The Number of Team members in an ICO |
| | Restricted Countries | String | The ICO Restricted Countries (Names) |
| | Restricted Countries Count | Integer | Number of Restricted Countries (Computed) |
| | Status | Integer | The Status of ICO (Dummy variable 1- Ended / 2- Failed) successfully ended or Failed |
| Status & Rating | Rating | Decimal | Rating adjusted on a scale from 1 to 10 based on different databases ratings |
| | Risk Score | Integer | The Risk score of an ICO (1- Very High / 2- High / 3- Medium / 4- Low / 5- Very Low) |
| | Hype Score | Integer | The Hype score, the social interest and activity (1- Very High / 2- High / 3- Medium / 4- Low / 5- Very Low) |
| | Soft Cap | String | The Minimum Amount of funds an ICO would require in order to start operating. (Amounts in USD/EUR/ETH/BTC) |
| Financial Information | ADJ Soft Cap | Float | Adjusted SoftCap with the amounts converted to USD only by using the calculated average exchange rate of ETH, BTC and EUR to that of USD over the total period of the sample. |
| | Hard Cap | String | The goal amount or the funding target an ICO is seeking (USD/EUR/ETH/BTC) |
| | ADJ Hard Cap | Float | Adjusted HardCap with the amounts converted to USD only using the calculated average exchange rate of ETH, BTC and EUR to that of USD over the total period of the sample. |
| | ICO Price | String | The Price of one Token (Price may be relative to USD or ETH or BTC) |
| | ADJ ICO Price | Decimal | Adjusted Price of an ICO Token converted to USD using the calculated average exchange rate of ETH, BTC, and EUR to that of USD over the period. |
| | Bonus | Integer | Bonus to investors in the Main Sale Period (1- Available / 2- Not Available) |
| | Bounty | Integer | Bounty in the Main Sale Period, cash (1- Available / 2- Not Available) |
| | Token Supply | Float | The Total number of Tokens supplied by the ICO to the investors (Token Units) |
| | Raised | Float | The Total Amount of Funds raised by the ICO. |
| | Total Supply post ICO | Integer | The supply amount of tokens after the ICO ends in the secondary exchange market (1- Increases / 2- Unchanged / 3- Decreases) |
| | Average Price | Decimal | The Average price of an ICO Token during the ICO Period |
| | Accepted Currencies | String | Names of Currencies accepted by the project as a repayment for the Tokens |

| | | | |
|--|---------------------------|------------|---|
| | Accepted Currencies Count | Integer | Number of Accepted currencies from Accepted currencies variable (Computed) |
| | Per To INV | Percentage | The percentage of Tokens supplied from the project to investors in relation to those retained by the project initiators |
| | Return | Percentage | The Return on Investment (Return of buying a Token) |
| | Growth Rate | Percentage | The ICO growth rate |

The variables we used in our study combine some that have been used by other studies. Variables Like the category, country of origin, Duration, Platform, KYC, Whitelist, Whitepaper, MVP/Prototype, Team number. The Restricted countries, Status, SoftCap, HardCap, ICO price, Bonus, bounty, token supply, amount raised and the percentage to investors.

There are other variables that we chose in our study that were not used by other literature. Such variables are the ICO Start and End Date. The Start and end dates of the pre-sale period. The token type (ICO/IEO/STO), the rating, risk score, and the Hype score. We focused on the project starting and ending dates to observe the variation in the interest in such instruments, number, and amounts raised, as a function of previous crypto-events (Bitcoin Bubble). We also used token type to assess the significant differences across the three types.

There is a third group of variables that we had calculated like the duration of the pre-sale period, the accepted currencies count and the restricted countries count. The accepted currencies and restricted countries have been used as nominal variables by other literature. We converted them to scale variable to test their increasing/decreasing effect on ICO success.

III. METHODS

In this part we describe the statistical analysis we conducted after the sample has been obtained and determined. First of all, it is critical to note that the amount raised used by previous studies as a dependent variable in the analysis would not be suitable on its own. The reason behind this is the fact that each ICO project requires a varying pre-specified goal amount of funds. Some require thousands, others require millions or even billions. The difference in the requirements of those amounts limit the ability of this variable to determine the success of an ICO on its own. Thus far because a project would still operate even if it does not reach the total Goal amount but when it reaches the soft cap (the minimum amount for a project to start operating). The project would still be considered successful.

In the following table we will present an example to better explain why the amount raised is unsuitable as a success determinant. This fact puts the methodology of some previous studies that we introduced before in the literature part to question.

Table 7: Project Status comparison

| Name | Status | Raised | ADJ Soft Cap | ADJ Hard Cap | R/SC | R/HC |
|----------|-----------|-----------|--------------|--------------|-------|-------|
| RxEAL | Succeeded | 279,000 | 67,877 | 30,000,000 | 4.110 | 0.009 |
| CrowdWiz | Succeeded | 7,234,387 | 2,000,000 | 26,000,000 | 3.617 | 0.278 |
| Datarius | Succeeded | 1,662,752 | 1,000,000 | 51,000,000 | 1.663 | 0.033 |
| Rhea | Failed | 18,888 | 1,244,404 | 13,400,000 | 0.015 | 0.001 |
| Ahoolee | Failed | 153,600 | 3,750,000 | 10,000,000 | 0.041 | 0.015 |
| VALUS | Failed | 8,949,421 | 10,000,000 | 100,000,000 | 0.895 | 0.089 |

The projects introduced in the table above are taken from the sample we utilized in our study. The green highlighted projects represent those that have succeeded. while the red ones had failed. When we look at the amounts collected, we observe that the project 'VALUS' has failed even after collecting funds more than all the projects that succeeded in this example. This is because the soft cap required by this project was significantly higher than that of the succeeded projects.

If we compared the hard cap and the soft cap we observe a wide significant difference between the two in the case of the succeeding projects. We note again that the hard cap is the goal amount of the project, and the soft cap is the minimum amount for the project to start operating. This small example demonstrates why the amount raised should not be used as a success determinant.

For this reason, we had to calculate a new variable which represents the ratio of the amount raised to the adjusted Soft Cap variable noted as (R/SC) in the previous table. After this calculation is done, we used SPSS to perform the analysis. We start by exploring the Dependent variable that we intended to use as a determinant of the success of a project.

We initially conducted a normality test with the null hypothesis of dependent variable following a Normal distribution. Yet the results showed a severe skewness and a non-normal distribution indication even after doing a logarithmic transformation to this variable.

Table 8: Significant Normality Testing

| Tests of Normality | | | | | | |
|--------------------|---------------------------------|-----|------|--------------|-----|------|
| | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Raised_to_SC | .111 | 447 | .000 | .894 | 447 | .000 |

a. Lilliefors Significance Correction

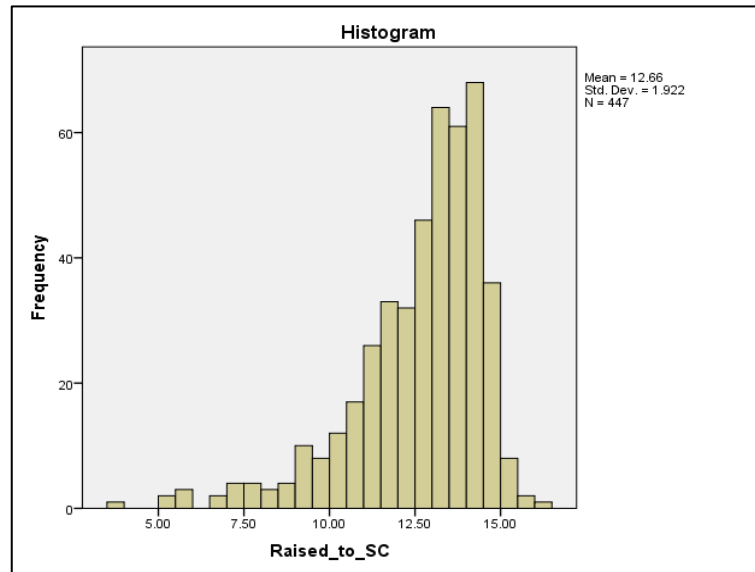


Figure 1: Normality Test Histogram

Above we provide the results of the Kolmogorov-Smirnova and Shapiro-Wilk tests of normality. The p-value is less than 0.05 which makes us reject the null hypothesis thus the variable does not follow a normal distribution. Even when looking at the histogram representation it is obvious the variable is away from being normally distributed.

The reason behind this skewness was not something unpredicted. As we observed during the data crossing there has been a wide range between the soft cap and hard cap amounts in some projects. In other projects this range was significantly smaller. Some projects collected funds in millions still did not succeed to reach the soft cap level. On the other hand, other projects with millions as a hard cap collected only thousands of dollars and succeeded. This is due to the very low soft cap relative to the goal amount.

With the Dependent variable not being normally distributed it cannot be used for significant prediction. We decided then to conduct a non-parametric statistical testing. For that we used another Nominal variable with the value of 1 if the ICO ended successfully or 2 if the project failed. This variable was obtained from the crossing of the different databases still it can be easily calculated. It can be obtained by dividing the amount raised to the Adjusted Soft Cap noted previously in table 7 as (R/SC). Every project with a ratio greater than or equal to 1 is determined as being successful.

We conducted three particular tests to assess the significance of the success-determinants variables to ICOs. We started by conducting a Mann-Whitney U Test. We employed it to test the significance of scale type variables from the time and financial sections in the variables table. The variables are Pre-ICO Duration, ICO main sale duration, the Rating of the ICO, the Adjusted Soft Cap,

Adjusted Hard Cap, Adjusted ICO price, Token supply, Percentage of Tokens to Investors, the amount raised, Restricted countries count and the accepted currencies count.

The second test is the Chi-Square Test which is used to analyze the association and the significance of variables with categorical type. The dependent variable here is the same as before (the Success or Failure) while the Tested variables are the platform used, the Category/Industry of the ICO, the Location of the ICO, Whitelist, Know your customer (KYC), Bonus, Bounty, Token type, whitepaper, Hype score, and MVP/Prototype.

The third test we conducted is KRUSKAL WALLIS test. We tested the Rating, Amount raised, Adjusted ICO price, Growth Rate, and Return as dependent variables with respect to the token type (ICO/IEO/STO) as an independent variable. We look here for any significant difference between those three types. Another Test we conduct is the chi-square test to fetch for any significant difference between the three types (ICO/IEO/STO) according to the Risk score range.

PART 3
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RESULTS

CHAPTER 3 – RESULTS

In this section, we provide the results obtained from our empirical analysis. We start by presenting the descriptive statistics which include location distribution, durations, amounts raised, and starting dates of the projects. Then in the following subsection, testing to the significant determinants of the projects is conducted alongside a comparison to the results obtained from previous literature. The final investigation would be a significance difference testing of the three types of crypto-crowdfunding mechanisms. Such testing is performed to resolve the question of whether IEOs and STOs would be able to replace the normal ICO projects.

I. DESCRIPTIVE STATISTICS

We start first by presenting some descriptive statistics. Below we present the Heat maps of ICO by country of origin generated from our sample.

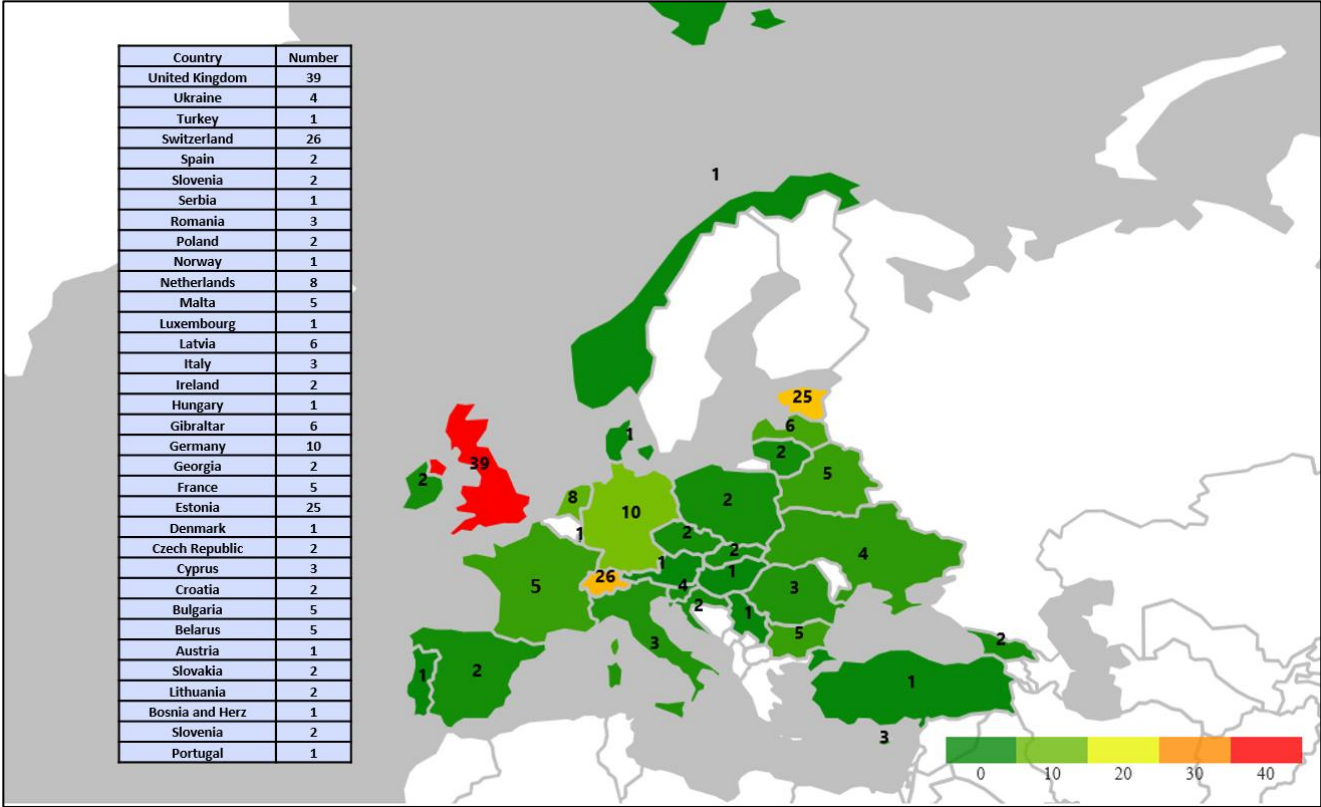


Figure 2: ICO Map (Europe)

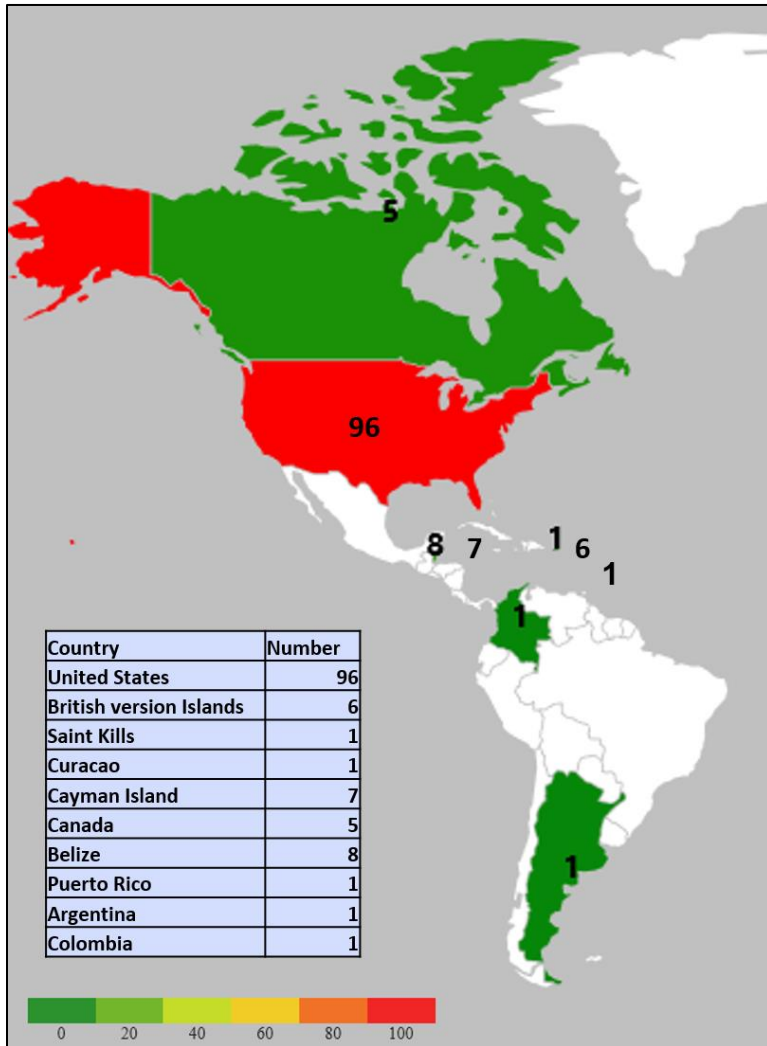


Figure 3: ICO Map (America)

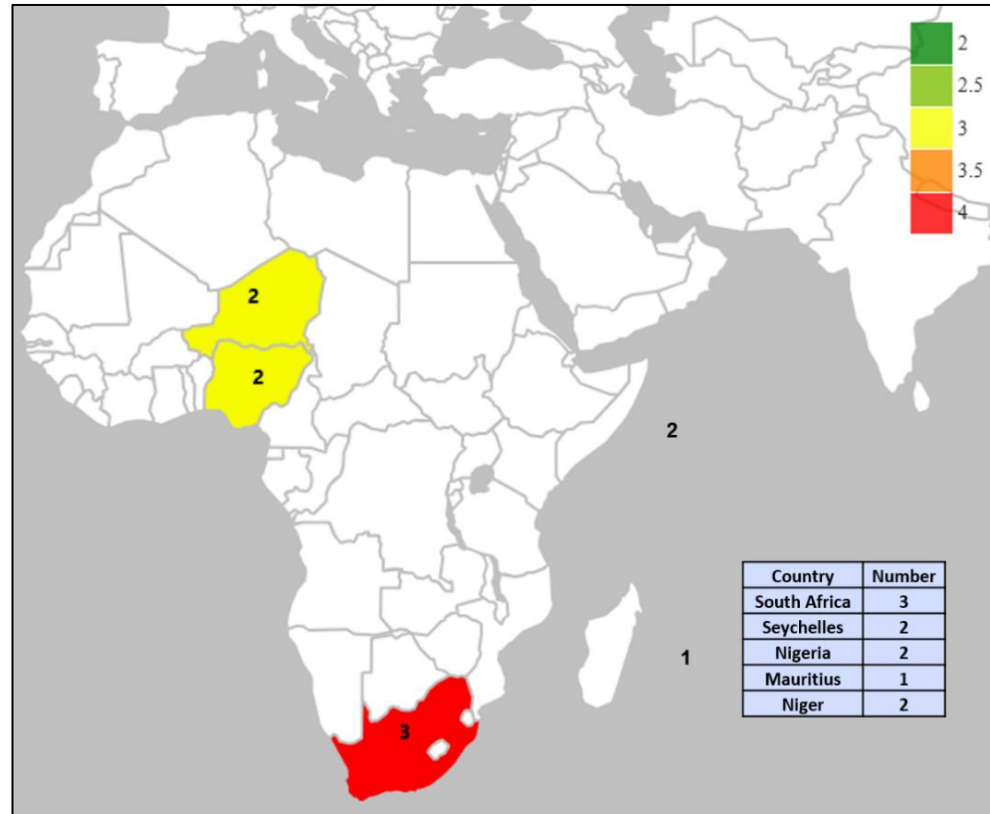


Figure 4: ICO Map (Africa)

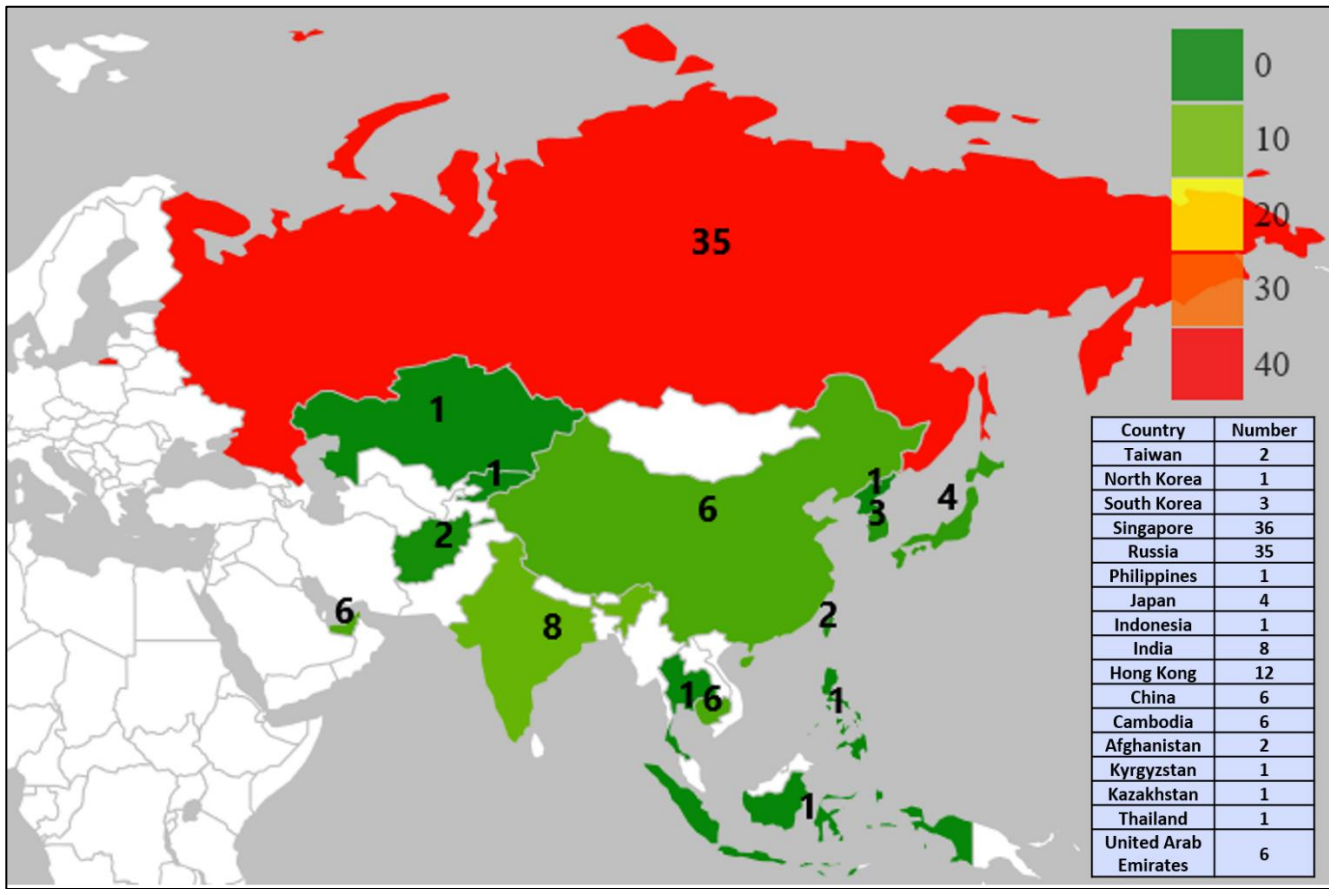


Figure 5: ICO Map (Asia)

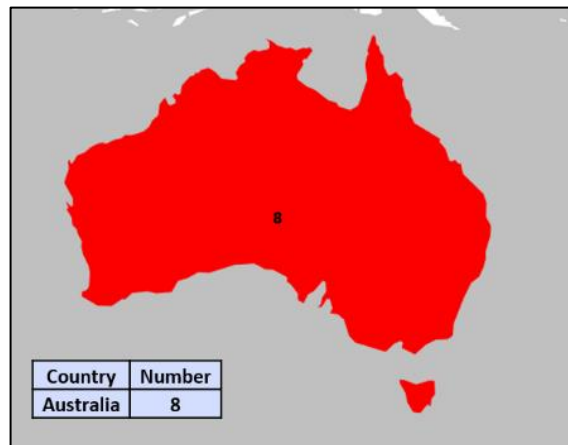


Figure 6: ICO Map (Australia)

From the maps above we observed there was a significant number of ICOs generated from places or Islands with fewer jurisdictions and sometimes are initiated from Tax havens like the British Version Islands, Cayman Island, Belize, Seychelles, and Mauritius. This is reasonable to some extent but also considered to be riskier for investors. On the other hand, we observe large and developed countries like China, France, and Japan with a limited number of ICOs. This can be explained by the fact that those countries retain a severe level of strict regulations. Some other counties even banned ICOs like China and South Korea.

Next, we look at the distribution of ICOs according to the category/Industry, we observe that 48.84% of ICOs are in the Business and Financial Services section followed by Technology and AI sector with 26.91%, and the lowest number ICOs are in the charity section with a percentage of 0.66%.

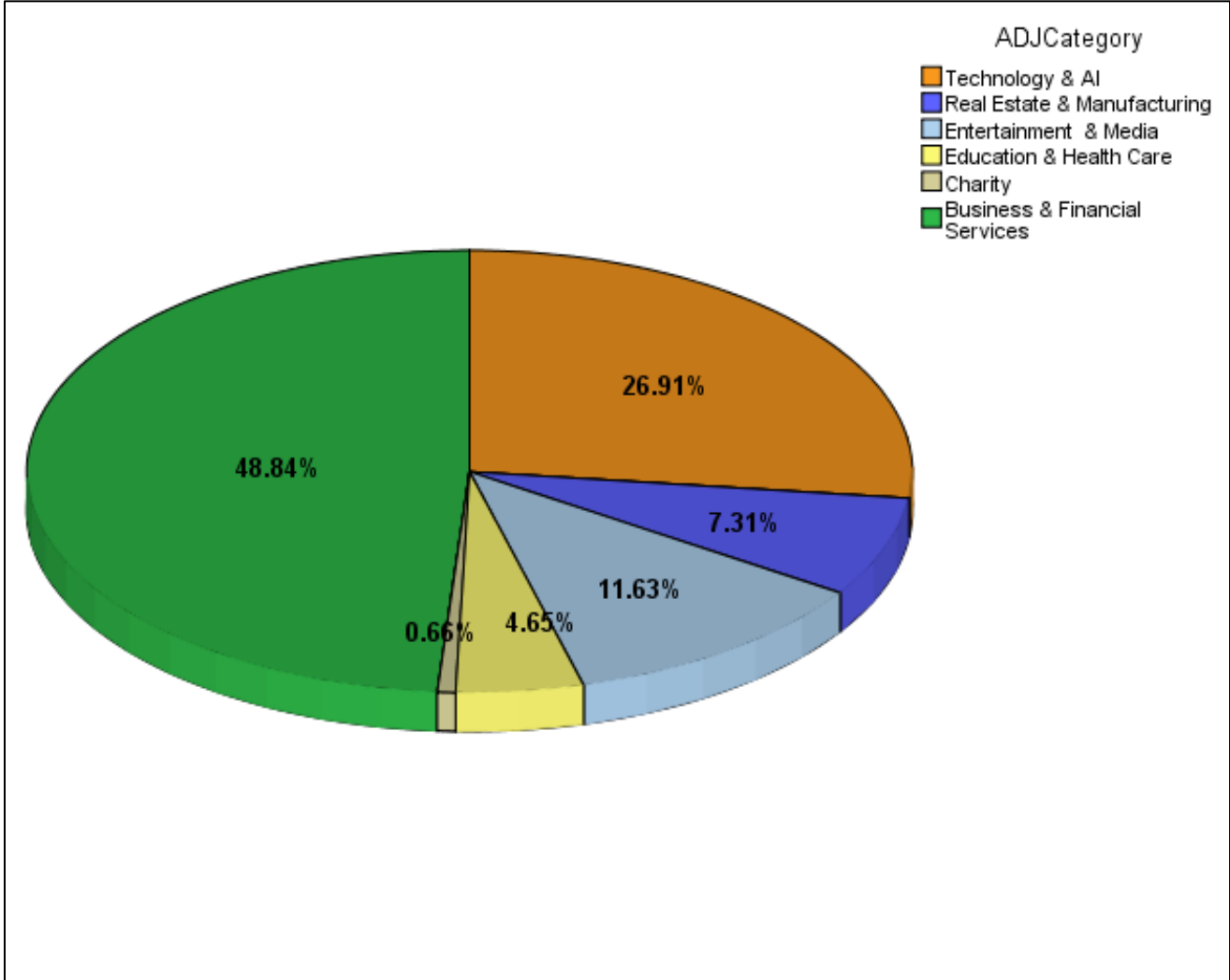


Figure 7: ICO projects categories

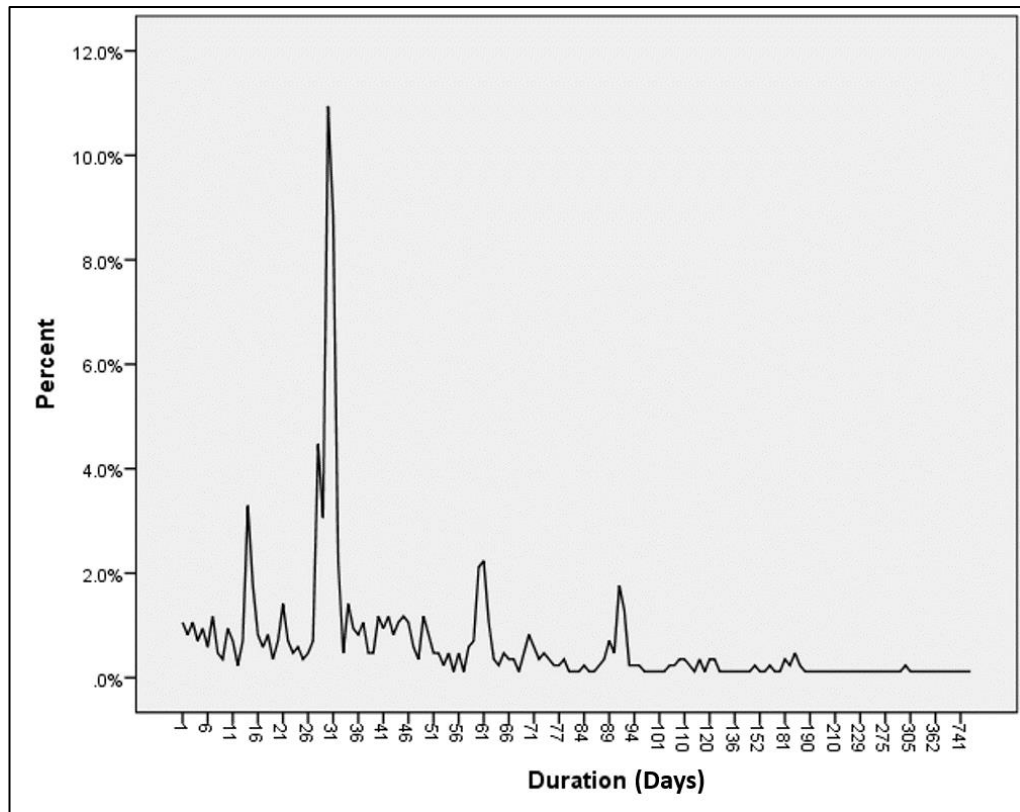


Figure 8: ICOs Duration Percentage Distribution

We also present the percentage variation of the duration of the ICOs in our sample. The above graph is generated showing the highest percentage is 12% with ICOs duration of 30 days. The next highest duration comes with almost 4% ranging between 12 and 26 days. After that comes the percentage of almost 2 percent for durations of 61 and 91 days. All this shows that ICO's duration generally varies between one, two, or three months. We also observe there are some ICOs with durations of only a few days. This indicates that ICOs could be an efficient way of collecting funds with considerably little Time.

Table 9: Amount Raised & Duration Correlation

| Correlations | | | |
|----------------|--------------------------|---------|----------|
| | | Raised | Duration |
| Spearman's rho | Correlation Coefficient | 1.000 | -.143** |
| | Raised Sig. (2-tailed) | . | .001 |
| | N | 616 | 514 |
| | Correlation Coefficient | -.143** | 1.000 |
| | Duration Sig. (2-tailed) | .001 | . |
| | N | 514 | 850 |

** . Correlation is significant at the 0.01 level (2-tailed).

To be more sure about the relation between duration and the amount raised we conduct a spearman correlation between the two variables. For full correlation matrix see **appendix 10**. The results identify a negative significant correlation with a coefficient of negative 0.143. This means that the amount raised increases when the duration decreases in 14.3% of the cases yet it does not represent a high ratio. This also means a higher amount of funds does not require a longer period to be collected. This relation is considered as an advantageous feature of ICOs over conventional mechanisms.

In the Next graph we represent the variation of the amounts raised in USD in our sample. The amounts vary between 14,591 USD and 60,000,000 USD. The highest frequency lying between 26,000,000 and 30,000,000 USD at almost 13% of the cases.

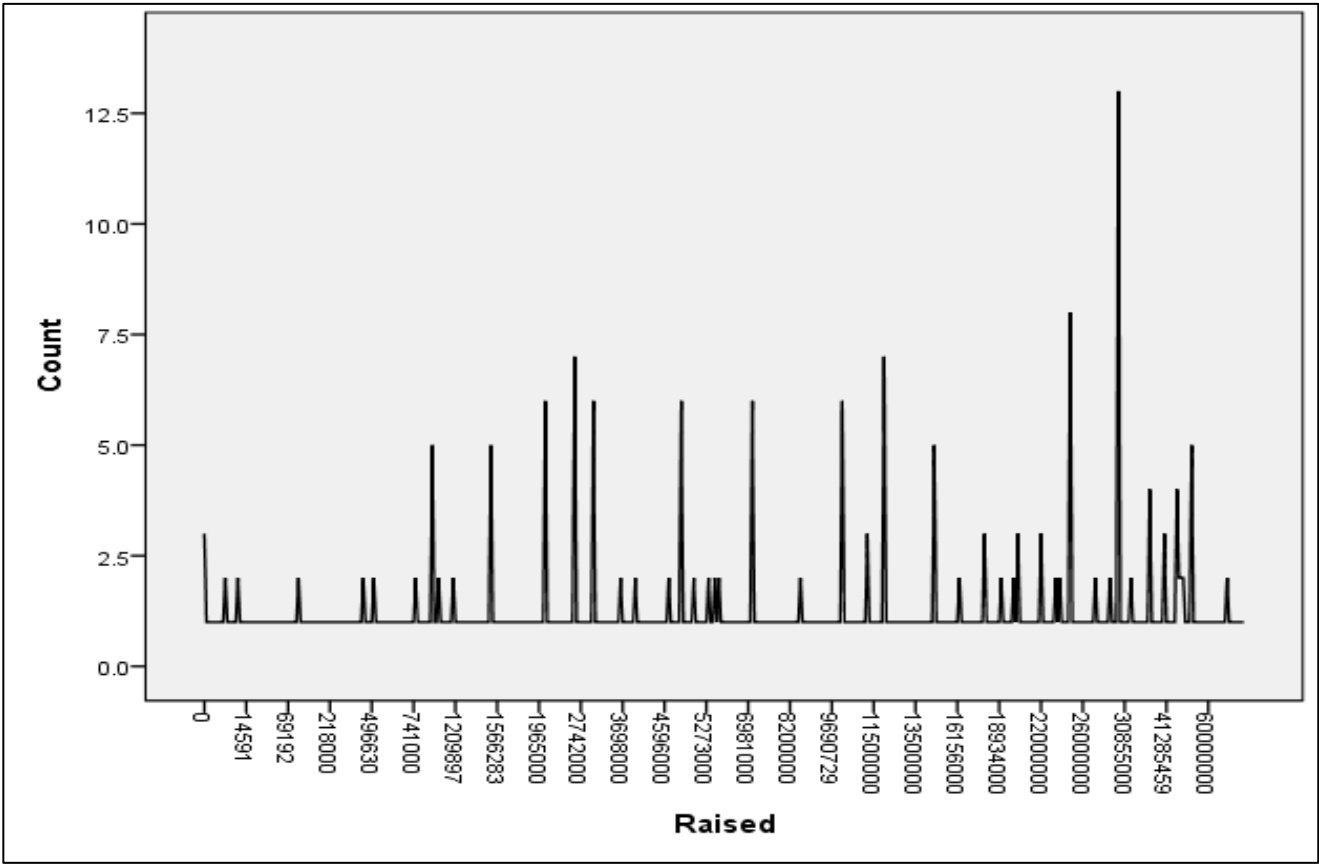


Figure 9: Amount Raised Distribution

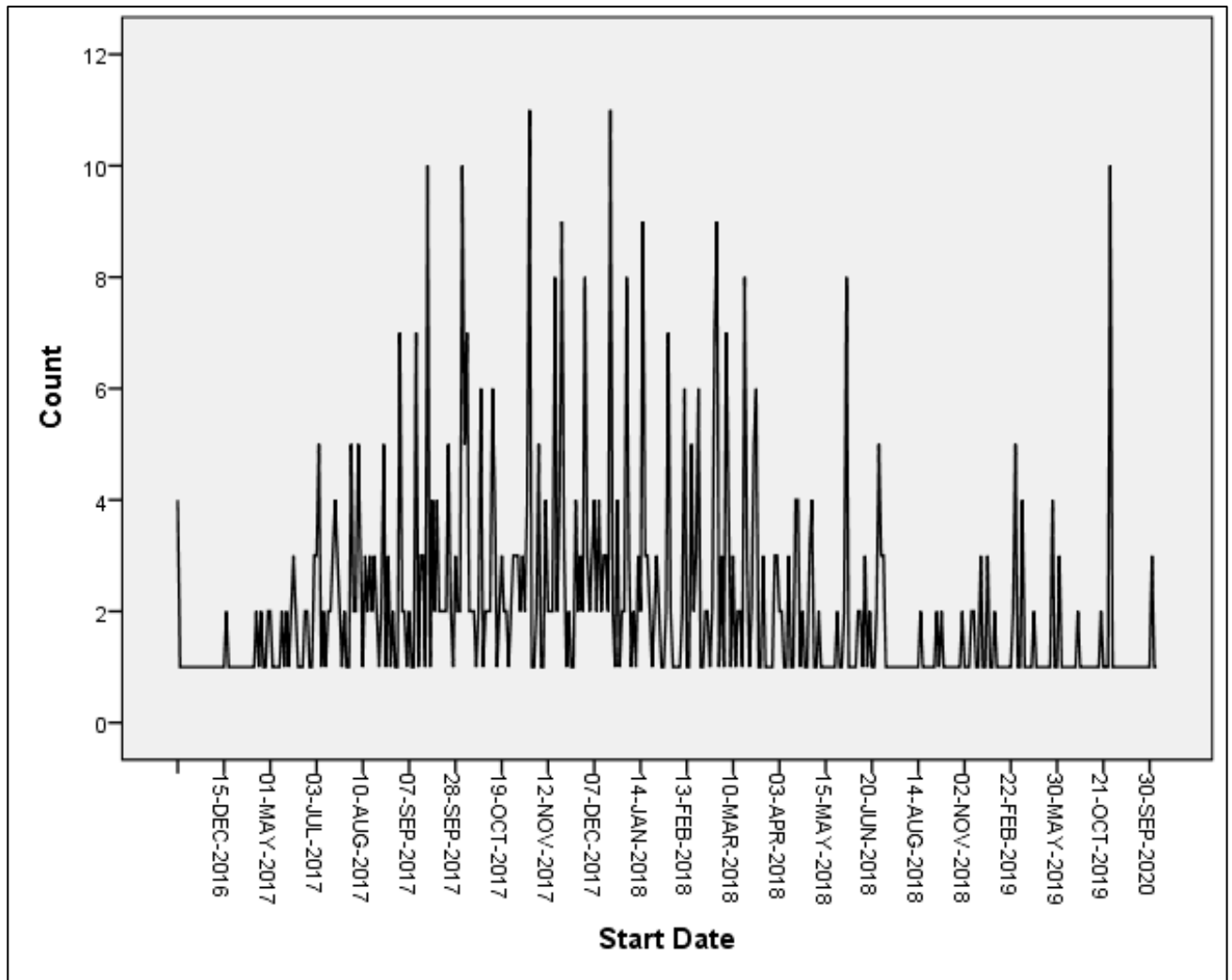


Figure 10: Start Date Distribution

For the Start Date presentation. We observe the highest percentage of coins having a start date ranging between October 2017 and January 2018 with a percentage of almost 12%. If we look at the timeline we observe the intense concentration of ICOs started between the Mid 2017 and Mid 2018. This is typically expected due to the investors' interest and hype during the Bitcoin Bubble period. It has caused an increase in the interest in such instruments to raise funds. The percentage of coins with starting dates of October 2019 increased also to almost 10%. Some coins have an upcoming starting dates of September 2020 at almost 3%.

II. SIGNIFICANCE TESTING

In this section, we present the results generated from the tests previously discussed in the methods section. We start by analyzing the results obtained from a Mann-Whitney U test. This test is used to investigate any significant relation between the dependent variable the success or failure of

a project (nominal Variable), and the independent (scale) variables. To see the broad detailed test, see **appendix 11**.

Table 10: Mann-Whitney U Significant Testing

| Tested Variable | Significance (2-tailed) |
|-----------------------------------|--------------------------------|
| ADJ Soft Cap | 0.644 |
| ADJ Hard Cap | 0.05 |
| ADJ ICO Price | 0.025 |
| Token Supply | 0.024 |
| Raised | 0.007 |
| PerToINV | 0.013 |
| Accepted Currencies Count | 0.346 |
| Restricted Countries Count | 0.235 |
| Rating | 0.013 |
| Team Num | 0.344 |
| Return | 0.000 |
| Pre_ICO_Price | 0.000 |
| Pre_ICO_Start | 0.695 |
| Start Date | 0.000 |
| Pre_Duration | 0.440 |
| Duration | 0.801 |

In The results of the Mann-Whitney U test show that the Start Date, Amount Raised, Per-ICO price, ADJ ICO Price, Token Supply, Percentage to Investors, Rating, and Return are significant with a p-value smaller than 0.05.

For the Hard Cap the p-value equals 0.05 thus it is insignificant. The ADJ Soft Cap, accepted currencies count, Restricted Countries Count, Team Number, Pre-ICO Start, Pre-ICO Duration, and Duration are not significant with a p-value > 0.05.

In this table we summarized the chi-square test results for the variables tested, the variable names, the p-value, and the Success to Failure status. For the detailed tests see **appendix 12**.

Table 11: Comparison of Success Determinants across studies

| Chi-Square Test | | | |
|-----------------|---------|---------------------|---|
| Variable | P-value | Significance Level | Failure/Success status |
| Platform | 0.00 | Highly Significant | ETH 42/391 - Other 4/27 |
| ADJ Category | 0.499 | Not Significant | x |
| Location | 0.02 | Significant | America 1/52 - Europe 13/96 - Asia 5/36 Africa 0/10 - Australia 0/8 |
| White List | 0.00 | Highly Significance | Y 96/669 - N 0/10 |
| KYC | 0.074 | Not Significance | x |
| Bonus | 0.012 | Significant | Available 1/49 Not Available 157/835 |
| Bounty | 0.072 | Not Significance | x |
| Token Type | 0.033 | Significance | ICO 15/207 - IEO 1/40 - STO 8/39 |
| White Paper | 0.062 | Not Significant | x |
| Risk Score | 0.03 | Significant | VL 0/2 - L 2/60 - M 15/152 - H 7/68 VH 0/7 |
| Hype Score | 0.00 | Highly Significant | VL 1/7 - L 26/135 - M 15/228 - H 2/100 VH 0/11 |
| MVP/Prototype | 0.062 | Not Significant | x |

The variables that showed insignificance are ADJ Category, KYC, Bounty, Whitepaper, and MVP/Prototype. For the variables showing significance. The platform with Ethereum being the blockchain used. A project is less likely to fail. when the Location of the projects is America we observe the lowest failure ratio followed by Europe then Asia. Africa and Australia have 0 failure rate but this result is not significant due to the low number of projects in the sample. Whitelist is also highly significant. The results also are not sufficient due to a sheer number of projects incorporating whitelists with respect to those that do not. Projects with bonus indicated significance with a failure ratio being remarkably low. The hype score is also increasingly significant. As the hype level increases the failure ratio decreases. The same can be said about the Risk score and failure ratio but in the opposite directions.

The Token Type failure or success is significant with the IEOs having the lowest failure ratio while STOs is having the highest failure rate. In the next table we present the results obtained from the previous literature on the success determinants significance. We compare them with the results obtained from our empirical study. After the comparison we generate a Preliminary judgment about the significance of each variable. It is important to note that this judgment is based on the higher occurrence of a significance level for the specific variable. In case of contradicting outcomes, no judgment will be introduced.

Table 12: Comparison of Success Determinants across studies

| Variables | Previous Studies | This Study | judgment |
|------------------------------|-------------------------|-------------------|-----------------|
| Duration | 3 HS/1 PS | NS | x |
| Whitepaper | 4 HS/2 NS | NS | x |
| Pre ICO Start | 3 HS/1 S/2 PS/2 NS | NS | x |
| Bonus | 1 S/5 NS | S | x |
| Accepted Currencies | 1 S/4 NS | NS | NS |
| Token Supply | 3 HS/1 S | S | S |
| Token Price | 2 NS | S | x |
| Token Profit (Return) | 1 S/2 NS | HS | x |
| Platform | 3 S/1 PS/3 NS | HS | S |
| Location | 1 S/1 PS | S | S |
| Sector/Category | 3 NS | NS | NS |
| Team Number | 3 HS/1 S/2 PS | NS | x |
| KYC | 2 HS/1 S/2 NS | NS | NS |
| Whitelist | 2 HS/1 S/2 NS | HS | HS |
| Soft Cap | 1 S | NS | x |
| Hard Cap | 1 HS | NS | x |
| MVP/Prototype | 1 HS | NS | x |
| Restricted Areas | 1 NS | NS | NS |

The Success Determinants across studies show three different outcomes:

- Accepted currencies, Sector/Category, KYC and Restricted Areas are not Significant.
- Token Supply, Platform, Location and Whitelist are significant.
- Duration, Whitepaper, Pre-ICO Start, Bonus, Token Price, Token Profit, Team number, SoftCap, Hard Cap and MVP/Prototype Have Contradicting Results, thus need Further investigation.

We believe the reason behind contradicting results is the difference in data sources, the different sample sizes and the different methodologies used. To overcome this controversial situation, we propose an analysis with a wider sample through data obtained and crossed over the maximum number of online Databases. It is also possible to generate a full population analysis especially that the number of crypto-crowdfunding project is still relatively low (around 6000 projects) which will typically provide the ultimate results.

Table 13: Re-Adjusted Rating Distribution Among

Hypothesis Test Summary

| | Null Hypothesis | Test | Sig. | Decision |
|---|---|---|------|-----------------------------|
| 1 | The distribution of Rating is the same across categories of Token Type. | Independent-Samples Kruskal-Wallis Test | .002 | Reject the null hypothesis. |

Asymptotic significances are displayed. The significance level is .05.

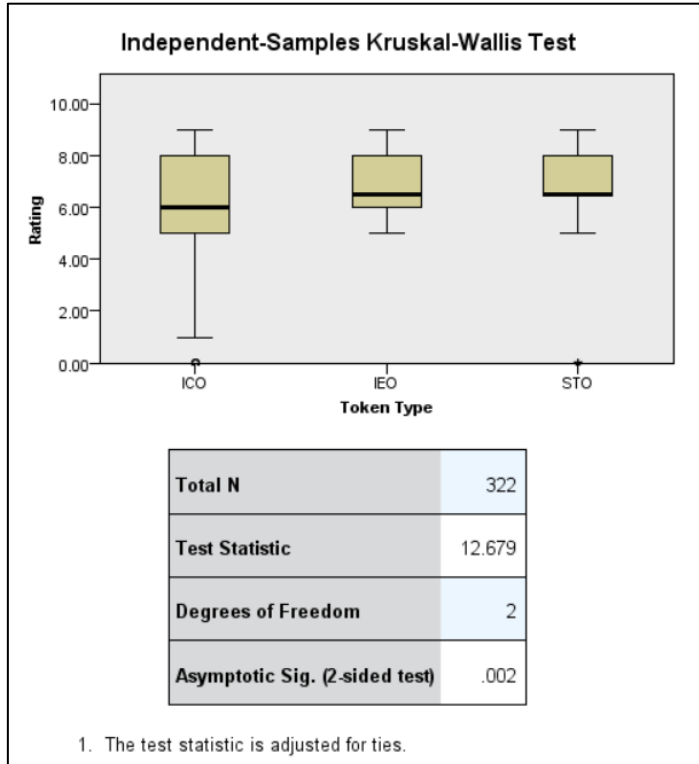


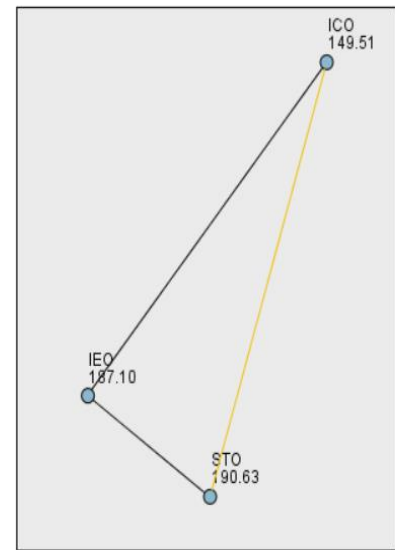
Figure 12: Kruskal-Wallis test presentation of Rating to (ICO/IEO/STO)

The Third test conducted is the Kruskal-Wallis Independent test. We obtained identical results regarding the ratings of the coins with a p-value of 0.002 > 0.05 leading to the rejection of the null hypothesis. This proves there is a significant difference between different types.

We present the pairwise comparison between token types. It indicates the differences in rating between ICOs and the two other groups. While the IEO-STO and ICO-IEO showed no significant differences, on the contrary, ICO-STO comparison proved a significant difference among them with a p-value of 0.006 < 0.05.

We also present the more detailed Kruskal-Wallis independent test where we observe there is almost no significant difference between the rating between IEOs and STOs ratings. It can be demonstrated visually when looking at the candlestick representation. We obtained a minimum and maximum rates ranging between 5 and 9. In contrast, the candlestick of ICOs revealed a broader

Pairwise Comparisons of Token Type



Each node shows the sample average rank of Token Type.

| Sample1-Sample2 | Test Statistic | Std. Error | Std. Test Statistic | Sig. | Adj.Sig. |
|-----------------|----------------|------------|---------------------|------|----------|
| ICO-IEO | -37.591 | 16.545 | -2.272 | .023 | .069 |
| ICO-STO | -41.124 | 13.305 | -3.091 | .002 | .006 |
| IEO-STO | -3.534 | 19.372 | -.182 | .855 | 1.000 |

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same. Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Figure 11: Pairwise Comparison of Rating Among (ICO/IEO/STO)

range between the minimum and the maximum of 1 and 9. This develops the significant difference between the groups and leads to a p-value of $0.002 < 0.05$ making us reject the null hypothesis.

STOs gaining a significantly higher rating reflects a higher trust in the coin. This is due to the lower risk associated. To be more sure about our results, an analysis with respect to the risk score will be conducted later.

Now we test the variation of the amount raised with respect to each token type. The same test is used but with the amount raised as the dependent variable. The test displayed insignificance with a p-value of $0.763 > 0.05$. We subsequently reject the null hypothesis and conclude there is no difference between the three types regarding the average amount raised.

Table 14: Amount Raised Distribution Among (ICO/IEO/STO)

| Hypothesis Test Summary | | | | |
|-------------------------|---|---|------|-----------------------------|
| | Null Hypothesis | Test | Sig. | Decision |
| 1 | The distribution of Raised is the same across categories of Token Type. | Independent-Samples Kruskal-Wallis Test | .763 | Retain the null hypothesis. |

Asymptotic significances are displayed. The significance level is .05.

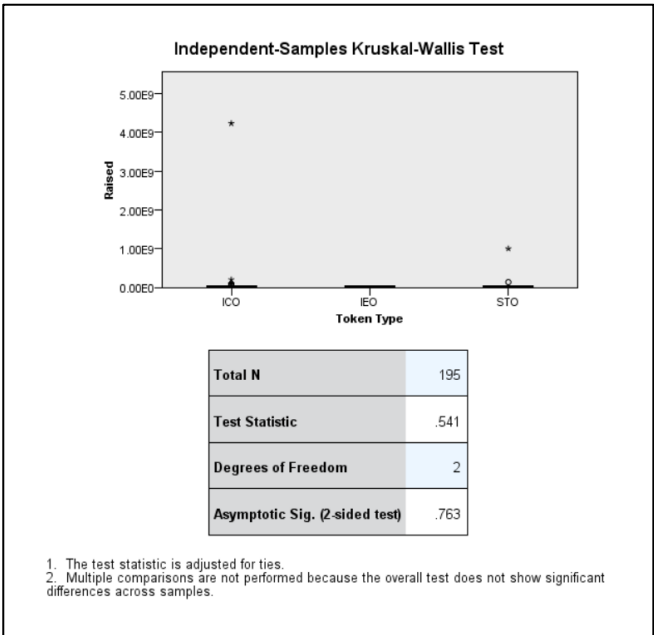


Figure 13: Kruskal-Wallis test presentation of Amount Raised to (ICO/IEO/STO)

We also observed the amounts raised graphically. It shows that the amounts raised of the three types on average are close to each other with the existence of rare outliers in ICOs and STOs. This no significant difference can also be considered as a firm indication that the ICOs could be replaced by

the new types (IEOs and STOs). Not only these new mechanisms could achieve the required funds. But also provide other novel innovative features to investors and Initiators.

In this Next test, we will check the difference in duration or the time an ICO, IEO, or STO require to collect the goal funds

Table 15: Duration Distribution Among (ICO/IEO/STO)

| Hypothesis Test Summary | | | |
|---|---|------|-----------------------------|
| Null Hypothesis | Test | Sig. | Decision |
| 1 The distribution of Duration is the same across categories of Token Type. | Independent-Samples Kruskal-Wallis Test | .000 | Reject the null hypothesis. |

Asymptotic significances are displayed. The significance level is .05.

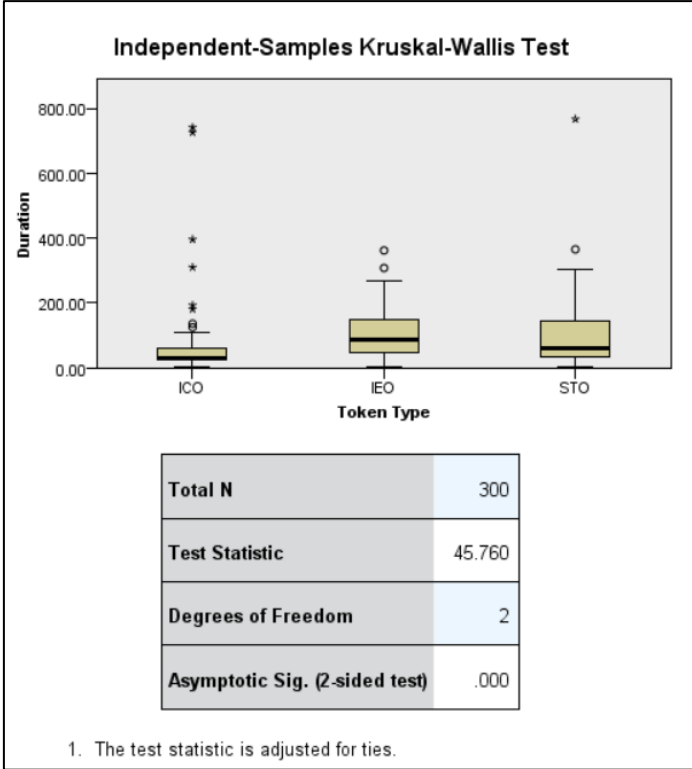


Figure 14: Kruskal-Wallis test presentation of Duration to (ICO/IEO/STO)

What we expected is that the average duration of an IEO would be lower than that of a normal ICO. This prediction is built upon the presence of massive media marketing associated with this offering. We also expect the STO duration to be similar to that of ICOs if not less.

After we had conducted the Independent test of Kruskal-Wallis, we observed a p-value of 0.000 < 0.05 which means that there is a significant difference between the length of ICOs, IEOs, and STOs. But after further analysis, the results came different from what we expected. The average duration of ICOs ranged between 1 to 100 days approximately with multiple outliers reaching 700+ days (2 years).

On the other hand, IEOs and STOs included an average length ranging between 1 to 300+ days approximately with STOs possessing more extreme outliers than IEOs.

From the following results. We expect that the following Duration may be affected by the more considerable number of ICO coin observations compared to IEOs and STOs in our sample. We derived this conclusion specifically in this test due to the massive number of outliers in the periods in ICOs.

Table 16: ADJ ICO Price Distribution Among (ICO/IEO/STO)

| Hypothesis Test Summary | | | | |
|-------------------------|--|---|------|-----------------------------|
| | Null Hypothesis | Test | Sig. | Decision |
| 1 | The distribution of ADJ ICO Price is the same across categories of Token Type. | Independent-Samples Kruskal-Wallis Test | .000 | Reject the null hypothesis. |

Asymptotic significances are displayed. The significance level is .05.

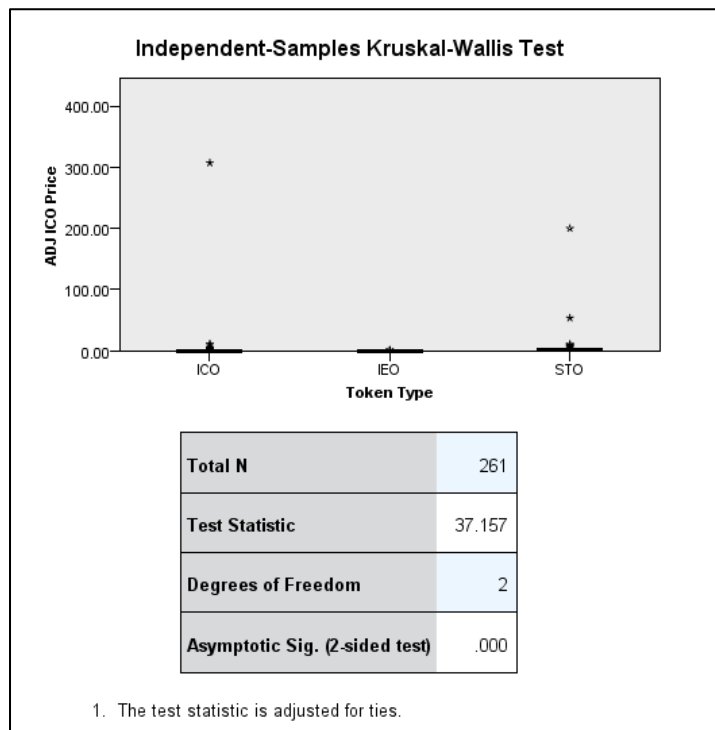


Figure 15: Kruskal-Wallis test presentation of ADJ ICO Price to (ICO/IEO/STO)

To test the differences in the cost of the tokens between the three types (ICO/IEO/STO) we continue using an independent test. The results show that there exists a difference in the token Prices. With the test generating a p-value of $0.000 < 0.05$, we searched for what is causing this difference. We found out that on average ICO, IEO, and STO prices were close to each other at a range between the fraction of a dollar and 10 dollars. There existed some outliers in the ICO and STO. Some coins had prices close to 300 dollars in the case of ICOs and some close to 200 in the case of STOs. For this reason, we can't provide a solid judgment on the outcome and believe we need a bigger sample to give a significant conclusion.

We also investigated any possible difference in Growth rate and return between ICO, IEO, and STO. Both tests showed a p-value greater than 0.05. Therefore, failing to reject the null hypothesis which means that the three types on average end up with the same Returns and Growth Rates.

Table 18: Growth Rate Distribution Among (ICO/IEO/STO)

| Hypothesis Test Summary | | | |
|---|---|------|-----------------------------|
| Null Hypothesis | Test | Sig. | Decision |
| 1 The distribution of Growth Rate is the same across categories of Total Supply post ICO. | Independent-Samples Kruskal-Wallis Test | .099 | Retain the null hypothesis. |

Asymptotic significances are displayed. The significance level is .05.

Table 17: Return Distribution Among (ICO/IEO/STO)

| Hypothesis Test Summary | | | |
|--|---|------|-----------------------------|
| Null Hypothesis | Test | Sig. | Decision |
| 1 The distribution of Return is the same across categories of Total Supply post ICO. | Independent-Samples Kruskal-Wallis Test | .429 | Retain the null hypothesis. |

Asymptotic significances are displayed. The significance level is .05.

The last rating test is a chi-square that will represent the variation of the risk score associated with the ICOs, IEOs, and STOs early mentioned. This risk score variable is an ordinal variable with score ranging between Very Low and Very High. The results are provided in the tables below. They indicate a significant difference between groups with a chi-square p-value of $0.00 < 0.05$. Looking closer into the Risk scores of each type, we observe an absence of scoring for the IEOs. For that, the comparison here is between ICOs and STOs. We observed a significant difference in the risk scores. Even with the diverse numbers of rated coins for each type. The ratio of risk in relation to the composite number of coins is still significant showing an upper hand for STOs over the ICOs which scored Higher risk.

Table 19: Chi-Square Test of Risk Score Distribution Among (ICO/IEO/STO)

Crosstab

| Count | | Risk Score | | | | | Total | |
|------------|-----|------------|------|--------|-----|----------|-------|-----|
| | | Very High | High | Medium | Low | Very Low | | |
| Token Type | ICO | 133 | 1 | 21 | 59 | 17 | 1 | 232 |
| | IEO | 42 | 0 | 0 | 0 | 0 | 0 | 42 |
| | STO | 66 | 1 | 4 | 12 | 3 | 0 | 86 |
| Total | | 241 | 2 | 25 | 71 | 20 | 1 | 360 |

Chi-Square Tests

| | Value | df | Asymp. Sig. (2-sided) |
|--------------------|---------------------|----|-----------------------|
| Pearson Chi-Square | 35.640 ^a | 10 | .000 |
| Likelihood Ratio | 48.578 | 10 | .000 |
| N of Valid Cases | 360 | | |

a. 9 cells (50.0%) have expected count less than 5. The minimum expected count is .12.

CONCLUSION

The cryptocurrency market has experienced a tremendous hype in the recent years especially between 2017 and the beginning 2019. This hype was caused by the considerable increase of bitcoin's price in that period. Since then there has been a big movement towards launching projects that utilizes the characteristics of cryptocurrencies to perform a crowdfunding-like campaigns. Methods to collect funds from investors that are compensated with crypto tokens that resemble Utility, cryptocurrency, or securities in return. The main reason behind the increasing interest in such operations is their low cost compared to conventional funding mechanisms.

With the great potential This new funding mechanism, initial coin offering (ICO), brings to the table a high risk was associated due to it being unregulated. This has led to the appraisal of fraud jeopardizing investors interests.

Due to this situation there has been a new trend towards using new crypto-crowdfunding techniques. These techniques will minimize the risk and provide investors with better quality and safer investment atmosphere. Such techniques are called Initial Exchange offerings (IEO) and Security Token Offering (STO).

There have been various attempts to study the success factors of such operations. Such attempts suffered many issues regarding the data sources integrity, sample sizes and the methods used to address the topic. Moreover, none of the literature that we covered has investigated any significant difference between the three types of crypto-crowdfunding (ICO/IEO/STO).

In this research we first dealt with the data sources integrity by extracting data from significant number of online sources then comparing them to insure data consistency and reliability. The problem with the limited sample size was resolved by conducting the research with a significantly more substantial number of records. Regarding the significant difference between ICOs, IEOs and STOs, we dedicated for it the last section in our empirical analysis.

In the first part of our study, we conducted a literature review. A review that included the definition of ICOs, its historical overview, a comparison between ICOs and conventional funding mechanisms. We subsequently determined the strength points of ICOs, their life cycle and the risk associated with them. After that we defined the new mechanisms IEOs and STOs and compared them to ICOs. We finished this part by a study matrix that included the significance results of success determinants of ICO obtained from ten previous studies.

In the results section, we presented the outcomes of the determinants of success in our sample study. Then we subsequently determined the results obtained from the analysis of the three types of

coins compared to each other. And ultimately conclude whether the modern types of crypto-crowdfunding may seem to be significantly better to normal ICOs.

Foremost, ICOs are initiated from different places worldwide with a significant number originating from locations with little regulation and less governmental control. An ICO can primarily take from one to three months as the duration but still it might last longer. The categories of ICOs vary across diverse industries with the financial Services leading. The amounts collected by ICOs vary between thousands, millions, and even Billions of dollars per project. The number of ICO projects rise in the times when crypto markets flourish due to events relevant to cryptocurrencies such as the bitcoin bubble.

The factors that showed significance to ICO success are; the Start Date of the ICO, the Price of the token in the pre-sale period, the price of the token in the main sale period, the total supply of tokens, the percentage of tokens provided for the investors, the platform or Blockchain used by the project, the existence of a whitelist, the availability of bonus to investors and the location or the origin of the ICO.

Regarding the comparison between the three types, ICOs, IEOs, and STOs. We found out that Ratings, Risk scores, and hype scores favor IEOs and STOs over the normal ICO projects. The Growth rates, returns, and the amounts raised are similar across the three types. This gives the IEOs and STOs the chance to replace Normal ICOs and providing investors with a more sensible quality and low-risk investment. It additionally provides the projects with the funds they need to launch their innovative projects.

The duration required by IEOs and STOs is higher than that of normal ICOs and the price of tokens varies across ICO, IEO, and STO. These last variables require further assessment and analysis to generate more concrete results.

Broadly speaking, the analysis of the ICOs, IEOs, and STOs requires far more extensive research. It is early to develop a final judgment of whether the new crypto-crowdfunding types would substantially replace the normal ICOs especially that there are still no unified decisions taken to rule and regulate such mechanisms to this date.

It is apparent that the world is turning towards a new financial ecosystem managed by decentralized data and projects built on top of Blockchains. We also believe that cryptocurrencies are here to stay and they will be more popular and more widely used in the coming future. For this reason, more profound data analysis on this topic should be conducted to better assess the current and future probable situation of such instruments.

For future research, the extraction of data on crypto tokens from more online sources would benefit by providing better data quality and integrity. Also, analysis on a larger scale would lead to a greater understanding of this new financial phenomenon. Many areas could also benefit from such outcomes.

Subsequent research could explore the accounting field. How will ICO operations be bookkept and dealt with or how to assess and evaluate the ICO's non-tangible assets such as the idea and the Team members? In finance, how could banks utilize and benefit from the characteristics of such mechanisms to create legal innovative financial instruments? In marketing, what are the best marketing techniques and requirements an ICO must follow to influence and convince a more substantial number of investors? In information technology, how technically secure are open source projects and how to enhance the trading platforms and networks? In regulations, how could ICOs be regulated to provide a secure financial instrument for both project initiators and investors yet keep on their decentralized nature and their high level of innovation.

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| TABLE 19: CHI-SQUARE TEST OF RISK SCORE DISTRIBUTION AMONG (ICO/IEO/STO) | 57 |

ABBREVIATIONS AND ACRONYMS USED

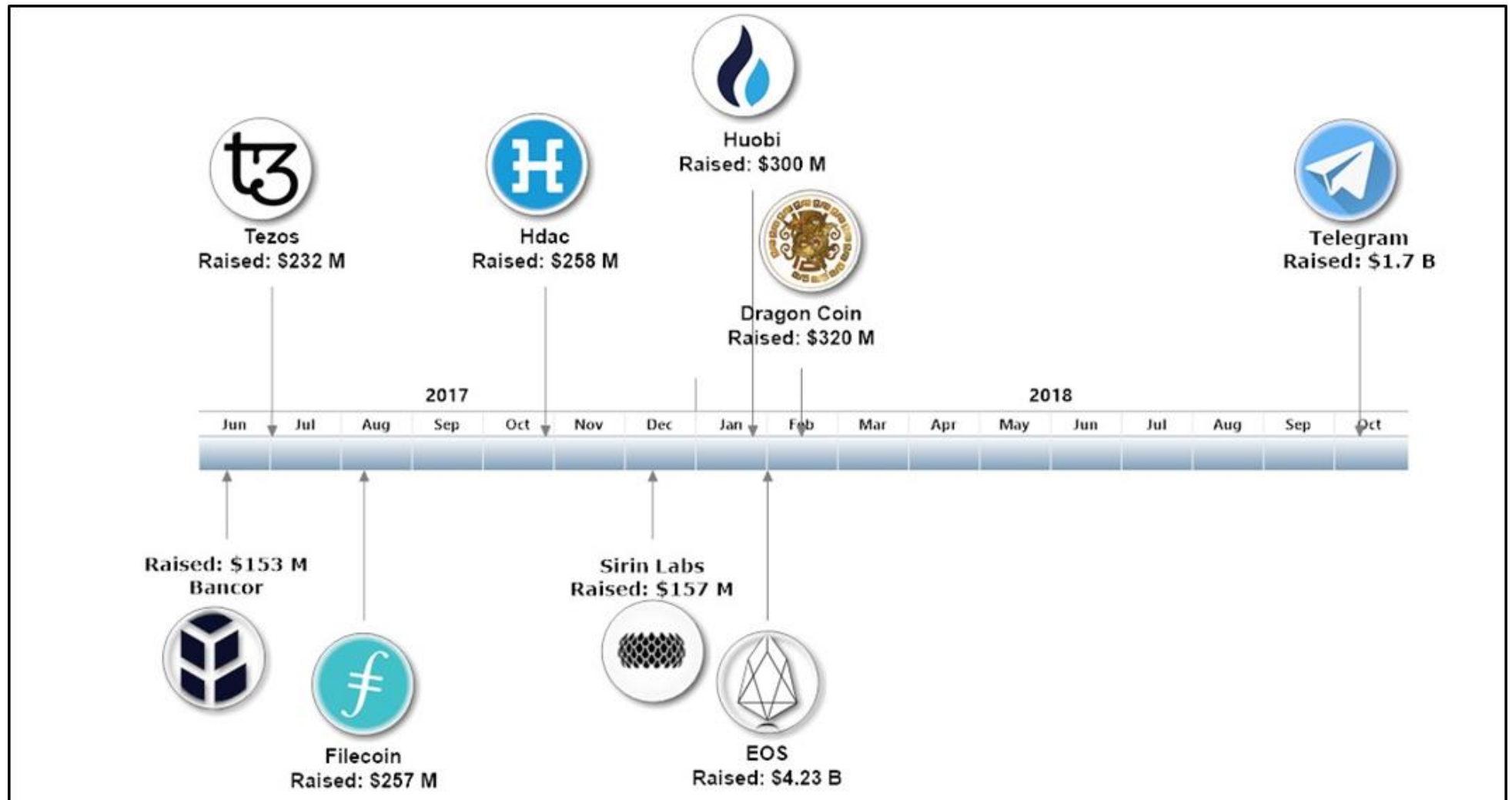
- **DAICO:** Decentralized Autonomous Initial Coin Offering
- **DLT:** Decentralized Ledger Technology
- **ICO:** Initial Coin Offering
- **IEO:** Initial Exchange Offering
- **KYC:** Know Your Customer
- **MVP:** Minimum Viable Product
- **SEC:** Security Exchange Commission
- **STO:** Security Token Offering

GLOSSARY

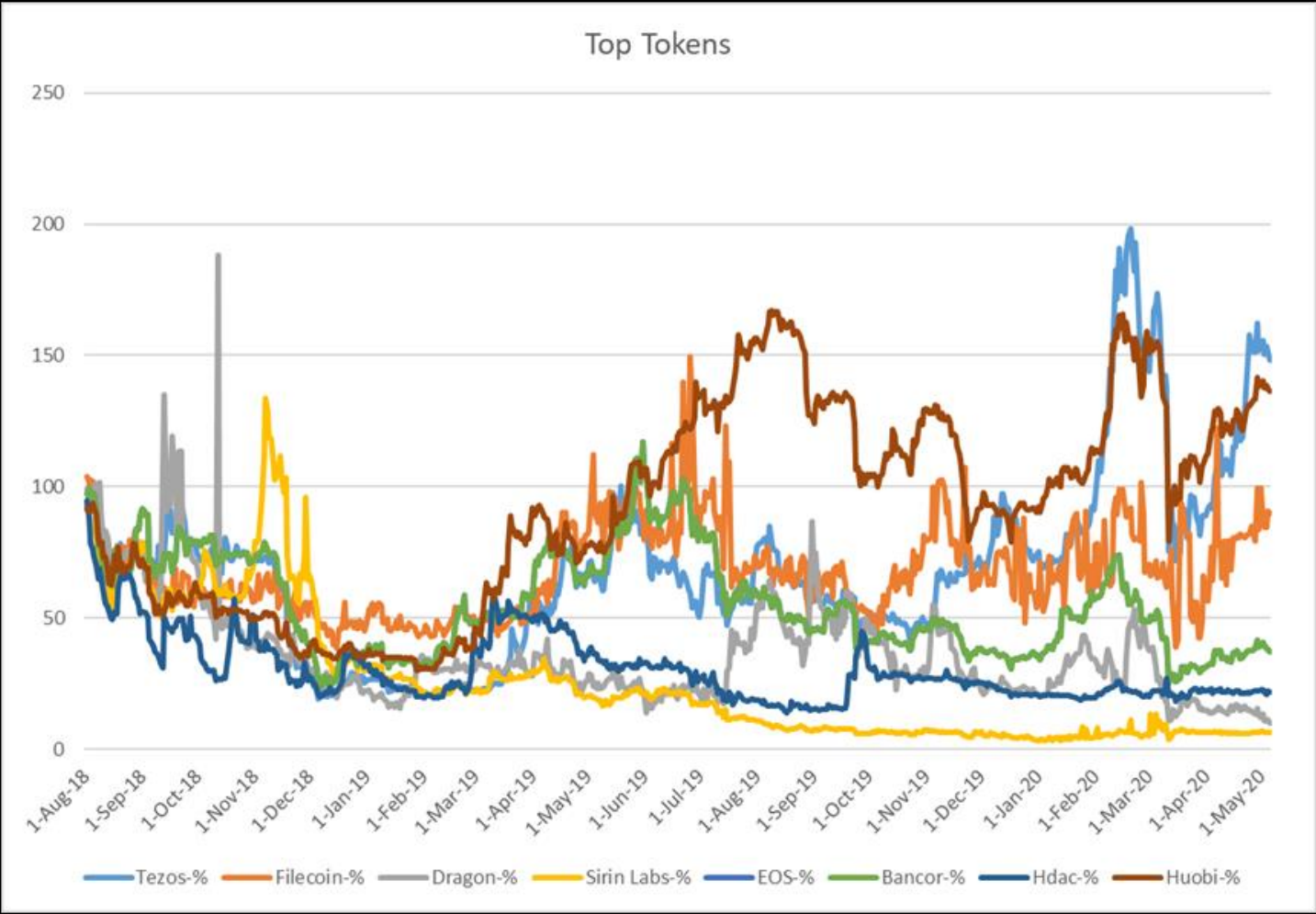
- **Blockchain:** A cryptography linked list of blocks. Each block references the previous one using unique hash address and contains information of a financial transaction and a timestamp.
- **CERAG Laboratory:** Centre d'Études et de Recherches Appliquées à la Gestion de l'Université Grenoble Alpes (UGA).
- **Databases Crossing:** Unify the structure of the tables extracted and create one large dataset that includes all the different variables with all its adjacent records.
- **Escrow Agent:** the contractor who binds the ICO fund seekers' commitment to the investors by temporarily holding the funds raised by the ICO.
- **Herd behavior:** A systematic and collective behavior of individuals in a bigger group towards a specific Unconscious decision.
- **Indiegogo:** An international crowdfunding platform for ideas (creative, cause, or entrepreneurial) founded in 2008.
- **IPO:** A fund raising method through the selling of a company's equity shares to the public.
- **Kickstarter:** A Crowdfunding platform founded in 2009. It provides funds for creative projects like films, games, and music to art, design, and technology.
- **Security Exchange commission (SEC):** independent federal government regulatory agency created by Congress in 1934. It is responsible for protecting investors, maintaining fair and orderly functioning of the securities markets, and facilitating capital formation.
- **Smart Contracts:** A Self executing agreement between different parties. the terms of such a contract are predetermined and written in lines of code. The contract is executed when specific criteria is satisfied.

TABLE OF APPENDICES

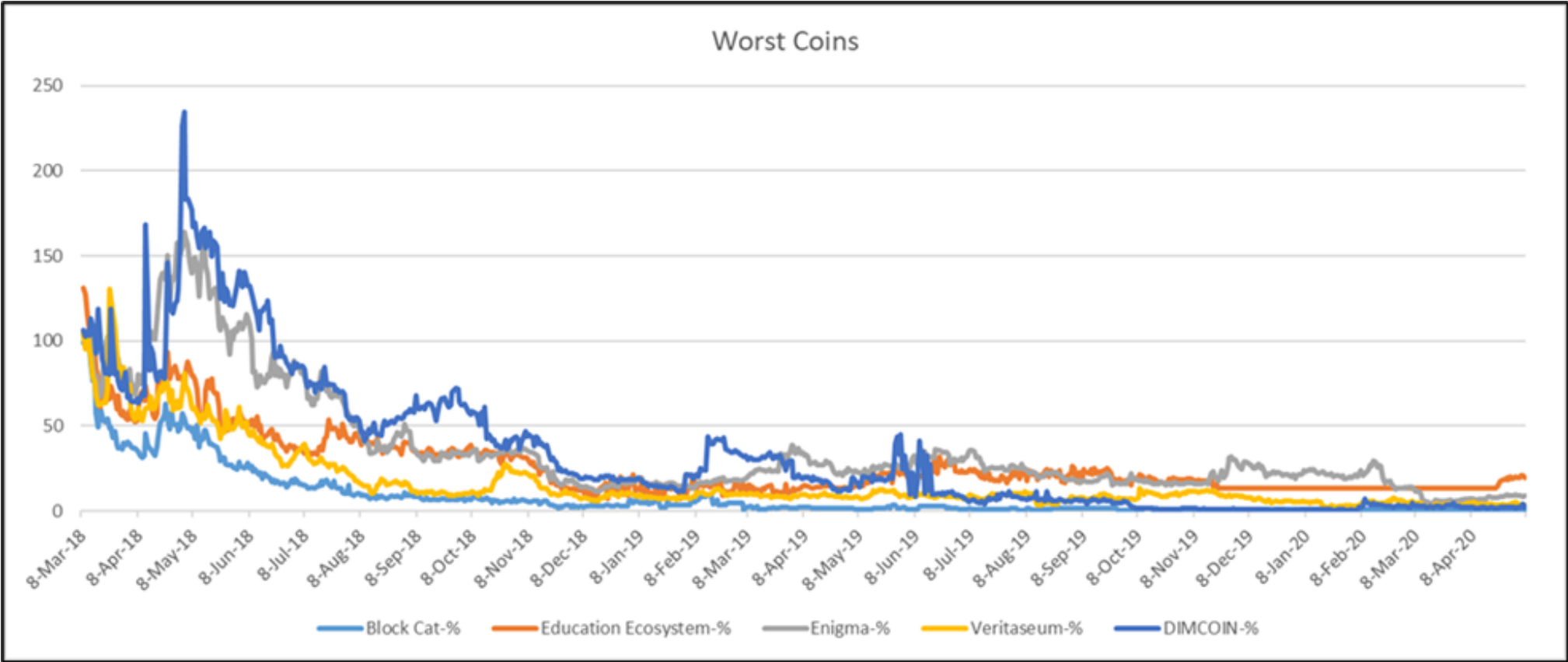
APPENDIX 1: TIME LINE OF BEST ICO PROJECTS.



APPENDIX 2: TOP TOKENS PERCENTAGE PRICE CHANGE.



APPENDIX 3: WORST TOKENS PERCENTAGE PRICE CHANGE.



APPENDIX 4: ICO VS CONVENTIONAL MECHANISMS SUMMARY.

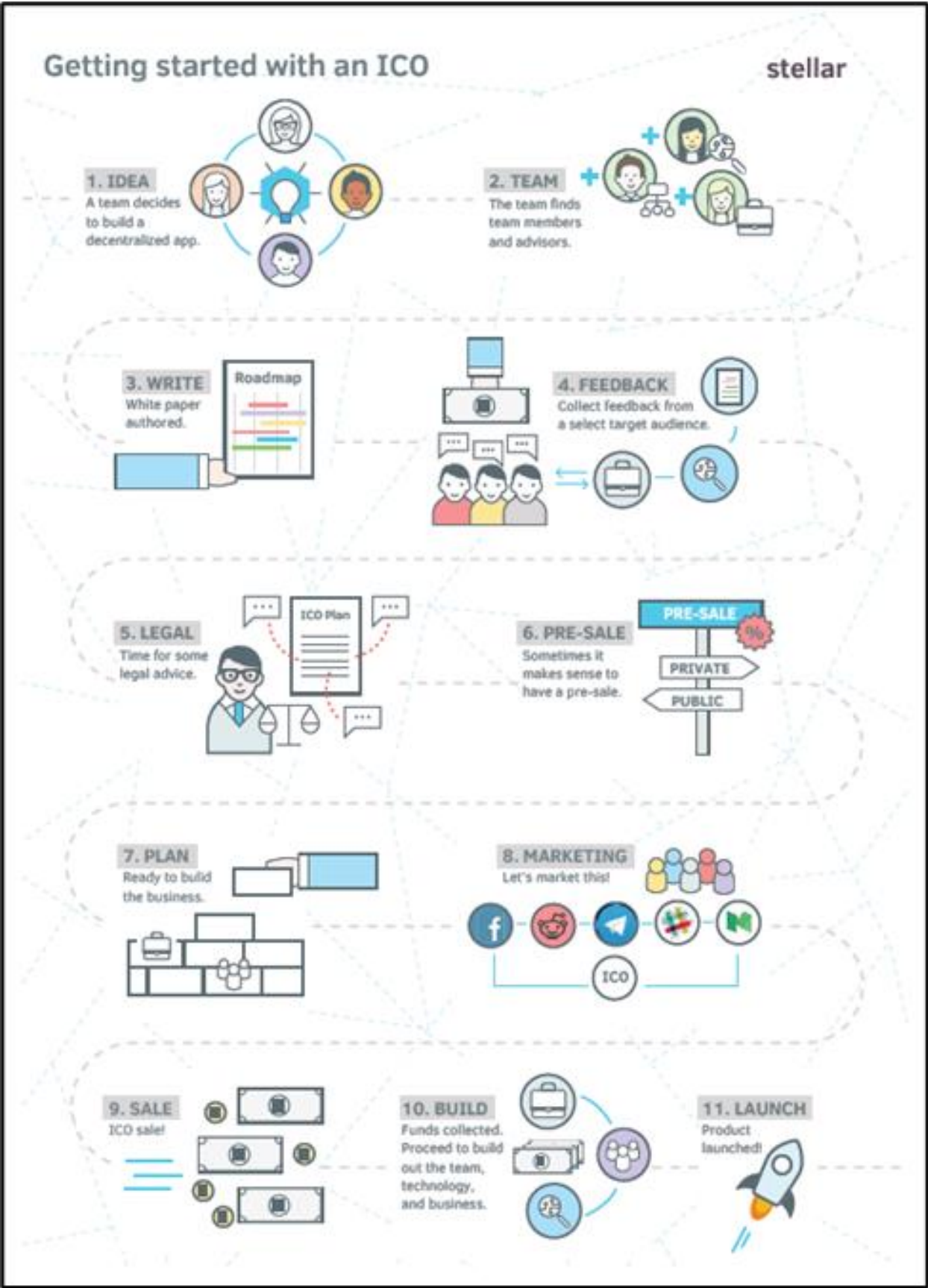
| Type | Pre-sale | Public sale | Ownership | Utility | Small Contribution | Seed Funding | Web Open Call | Company Track record | Proof of concept | Multi-stage | Intermediary | Transaction Cost | Regulations | Investors | Liquidity |
|-----------------|----------|-------------|-----------|---------|--------------------|--------------|---------------|----------------------|------------------|-------------|--------------|------------------|-------------|-----------------------------------|-----------|
| ICO | x | x | | x | x | x | x | | x | x | | Very Low | No | Early Adopters - Selfless | High |
| IPO | | x | x | | x | | | x | | | x | Very High | High | Sophisticated - Financial Driven | High |
| Crowd funding | x | x | | | x | | x | | x | | x | Low | Medium | Early Adopters - Financial Driven | Low |
| Venture Capital | | | x | | | x | | x | | | x | Very High | High | Sophisticated - Financial Driven | Low |

APPENDIX 5: COMPARISON BETWEEN ICOS AND OTHER FINANCING MECHANISMS BY (LIPUSCH 2018).

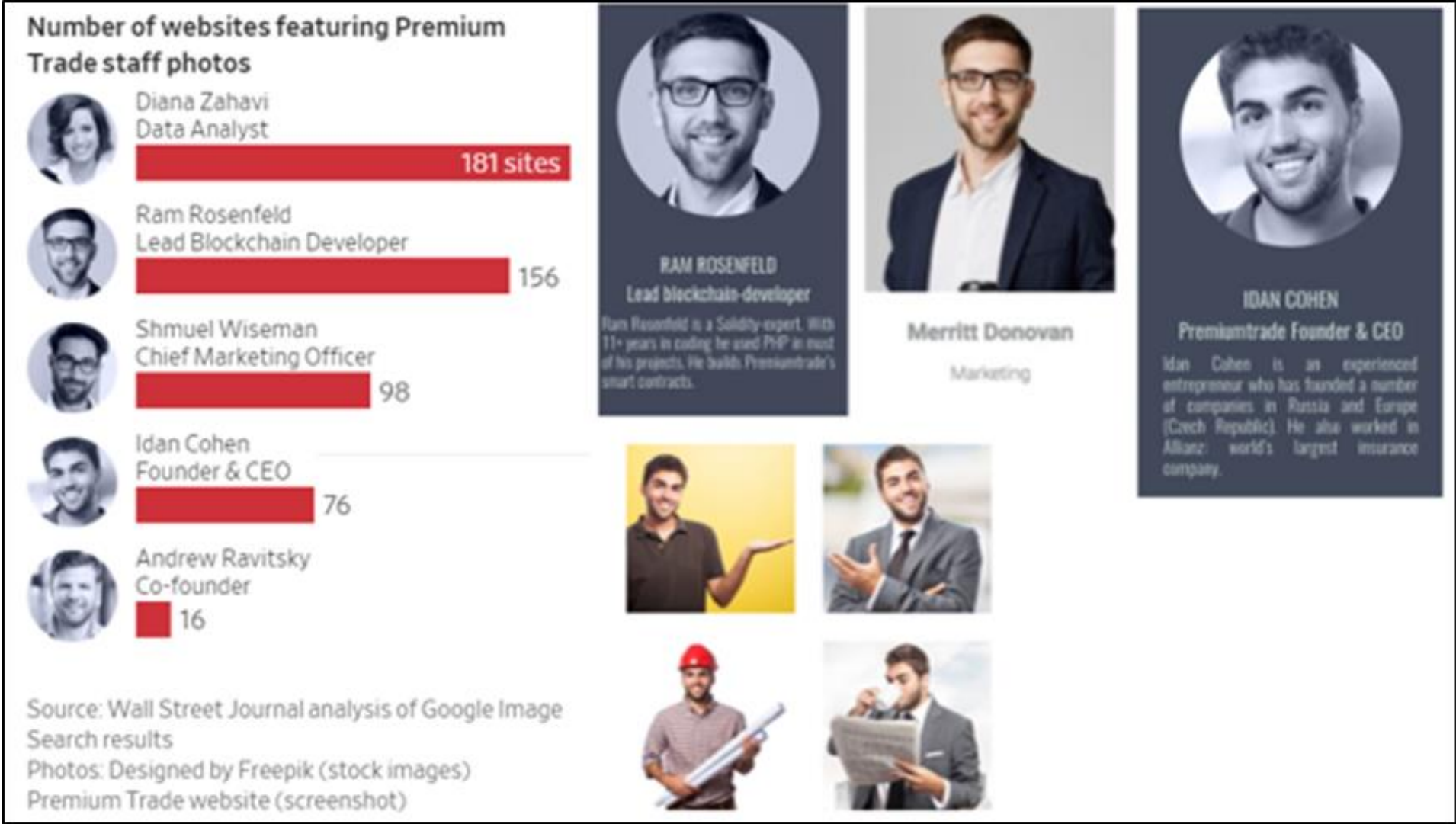
| | Crowdfunding | Venture Capital | IPOs | ICOs |
|---------------------------|---|--|--|--|
| Type of Funding | <ul style="list-style-type: none"> ▪ Open call on the web ▪ Pre-seed funding ▪ Pre-selling | <ul style="list-style-type: none"> ▪ Private equity ▪ Seed funding | <ul style="list-style-type: none"> ▪ Public offering ▪ Growth capital | <ul style="list-style-type: none"> ▪ Open call on the web ▪ Seed funding ▪ Pre-selling |
| Type of Capital Seekers | <ul style="list-style-type: none"> ▪ Individual projects as well as new ventures ▪ Artistic-, design- as well as technology-projects ▪ Projects with a first prototype | <ul style="list-style-type: none"> ▪ High technology start-ups (e.g. IT, clean technology or biotechnology) ▪ New ventures with proprietary technologies | <ul style="list-style-type: none"> ▪ Established ventures with proven track record ▪ Scalable/ high growth ventures | <ul style="list-style-type: none"> ▪ New venture with idea or proof of concept ▪ New venture with open source technology |
| Type of Capital Givers | <ul style="list-style-type: none"> ▪ Sponsors, customers, & semiprofessional investors ▪ Motivations: ROI, altruistic, & hedonic ▪ Provision of ideas, feedback etc. | <ul style="list-style-type: none"> ▪ Institutional investors (i.e. accredited investors) ▪ Motivation: ROI ▪ Smart capital (i.e. provision of know-how) | <ul style="list-style-type: none"> ▪ Institutional & private investors ▪ Motivation: ROI | <ul style="list-style-type: none"> ▪ Developers (believing in the merit of a certain technology), customers, & investors ▪ Motivation: ROI, hedonic, altruistic etc. |
| Transaction volume & Cost | <ul style="list-style-type: none"> ▪ Small transaction volume suitable to realize single projects and first prototypes ▪ Low transaction costs due to single point of contact (i.e. the platform) | <ul style="list-style-type: none"> ▪ Medium transaction volume suitable to cover all the costs associated with research and development, marketing, & operations. ▪ High transaction costs due to high degree of institutionalization (i.e. a high number of intermediaries and legal regulations) | <ul style="list-style-type: none"> ▪ High transaction volume suitable to expand and grow a company ▪ High transaction costs (e.g. banking and legal fees) due to high degree of institutionalization | <ul style="list-style-type: none"> ▪ Medium transaction volume suitable to cover all the costs associated with research and development, marketing, & operations. ▪ Low transaction costs due to direct interaction between capital seeker & capital giver |

| | | | | |
|---------------------|--|--|---|--|
| Regulation and Risk | <ul style="list-style-type: none"> ▪ Low degree of regulation: Jobs Act/SEC ▪ Low risk mediation due to informal means (e.g. reputation mechanisms) ▪ Moderate risk (due to low transaction volumes and small funding increments) | <ul style="list-style-type: none"> ▪ High degree of regulation: SEC ▪ High risk mediation through formal contracts and agreements ▪ High risk | <ul style="list-style-type: none"> ▪ High degree of regulation: SEC ▪ High risk mediation through informational requirements (i.e. prospectus) as well as formal contracts ▪ High risk | <ul style="list-style-type: none"> ▪ Currently no regulation ▪ Low risk mediation due to informal means (e.g. third party website ratings) ▪ Higher risk due to limited legal obligations and investor protection |
| Liquidity | <ul style="list-style-type: none"> ▪ Low liquidity: no possibility to trade investments or raise new capital | <ul style="list-style-type: none"> ▪ Low liquidity: limited possibility to trade investments or raise new capital ▪ Long-term investments | <ul style="list-style-type: none"> ▪ High liquidity: exchanges allow to trade shares and raise new capital easily | <ul style="list-style-type: none"> ▪ High liquidity: existing investment can be traded on third party exchanges |

APPENDIX 6: INITIAL COIN OFFERINGS LIFE CYCLE.



APPENDIX 7: NUMBER OF WEBSITES FEATURING PREMIUM TRADE STAFF PHOTOS.



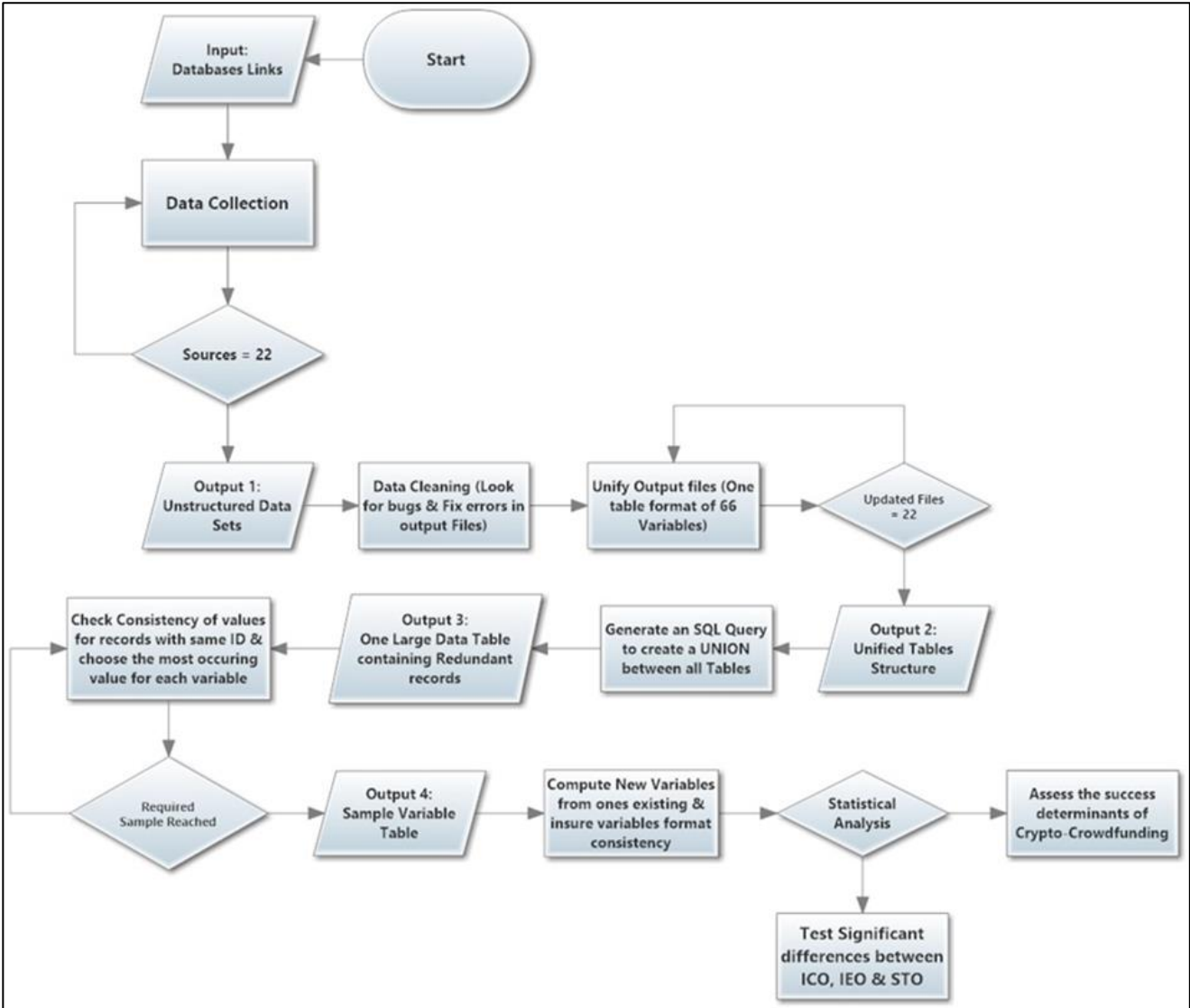
APPENDIX 8: SUCCESS DETERMINANTS OF PREVIOUS STUDY PAPERS.

| Article | | Initial Coin Offering (ICOs) Determinants of successful Initial Coin Offering (ICOs) (Diogo Filipe Barros Cruz) | Initial coin offerings (ICOs) to finance new ventures (Christian Fisch) | What an Investor Wants; What an Investor Needs: Identifying Deceptive Projects on Blockchain Market (Eunhee An et al) | What determines success in initial coin offerings? (Roosenboom et al) |
|------------------------|-----------------------|--|---|--|---|
| Year | | 2019 | 2019 | 2019 | 2020 |
| Sample | | 206 | 423 | 929 | 630 |
| DataBases | | Coindesk.com, Icobench.com, CoinMarketCap. | Expertrating.com, Coinmarketcap.com, CoinSchedule.com | Not Specified | ICObench.com, CoinmarketCap.com |
| Dependent Variables | Success | F | F | F | F |
| | Amount Raised | T | T | T | T |
| Independent variables | Patent | x | Not Significant | x | x |
| | Duration | Poorly Significant | Highly significant | x | Highly significant |
| | White paper | Not significant | Highly significant | Highly significant | x |
| | programming code | x | Significant | x | |
| | Presale | Poorly Significant | Not Significant | x | Significant |
| | Bonuses | Not significant | x | Not significant | Significant |
| | Accepted currency | x | x | Significant | Not significant |
| | Fiat Currency | x | x | x | Poorly significant |
| | Token Supply | Significant | Highly significant | x | Highly significant |
| | Token Price | x | x | x | Not significant |
| | Token service | Not significant | Not Significant | x | x |
| | Token governance | Not significant | Not Significant | x | x |
| | Token profit | Not significant | Not Significant | x | x |
| | Token contribution | x | x | x | x |
| | Jurisdiction | Highly significant | x | Not significant | x |
| | Fintech | Not significant | x | | |
| | Platform | Not significant | Significant | Significant | Not significant |
| | Smart contract | Poorly Significant | x | x | x |
| | Location | Poorly Significant | Significant | | x |
| | Sector | Not significant | Not Significant | Not significant | x |
| | Team number | Poorly Significant | x | Poorly significant | Highly significant |
| | Verified Team members | x | x | Significant | x |
| | Team Background | x | x | x | x |
| | Market Sentiment | x | Significant | Poorly significant | x |
| | Vision | x | x | x | x |
| | ICO profile | x | x | x | x |
| | KYC/Whitelist | x | x | Highly significant | x |
| | Ethereum return | x | x | x | Significant |
| | Ethereum volatility | x | x | x | Highly significant |
| | Github Pre-ICO | x | x | x | Highly significant |
| | Token retention (%) | Significant | x | x | Not significant |
| | Ln(SoftCap) | x | x | x | x |
| | Ln(HardCap) | x | x | x | Highly significant |
| ICO_Volume | x | x | x | Highly significant | |
| Number of Advisors | x | x | Significant | x | |
| Verified Advisors | x | x | Not significant | x | |
| MVP (Prototype) | x | x | Highly significant | x | |
| Marketing Social Media | x | x | Highly significant | x | |
| Minimum Contribution | x | x | Not significant | x | |
| Telegram | x | x | x | x | |
| Escrow agent | x | x | x | x | |
| Expert CEO | x | x | x | x | |
| Gender | x | x | x | x | |
| Marketplace exchange | Significant | x | x | x | |
| Voting rights | Not significant | x | x | x | |
| Restricted Areas | x | x | x | x | |

| Article | | Financing FinTech Projects: An exploration of the Determinants of Success of Initial Coin Offerings (Andrea Moro) | Are Blockchain Crowdsales the New "Gold Rush"? Success Determinants of Initial Coin Offerings (Ryan Amsden et al) | What Makes an ICO Successful? An Investigation of the Role of ICO Characteristics, Team Quality and Market Sentiment (Lauren Burns) |
|------------------------|-----------------------|---|---|--|
| Year | | 2018 | 2018 | 2018 |
| Sample | | 273 | 1,009 | 146 |
| DataBases | | Coindesk.com | ICObench.com, Cryptoslate.com | Coinmarketcap.com, Tokendata.io, Icocaps.com, Icodata.io, Smithand-crown.com, Cryptocompare.com, Icomarks.com, Coingecko.com, Trackico.com, Icobench.com, Coincheckup.com. |
| Dependent Variables | Success | T | F | F |
| | Amount Raised | F | T | T |
| Independent variables | Patent | x | Not significant | x |
| | Duration | x | x | x |
| | White paper | x | Highly significant | x |
| | programming code | Highly significant | Not significant | x |
| | Presale | Highly significant | Highly significant | Not significant |
| | Bonuses | Not significant | Not significant | x |
| | Accepted currency | x | Not significant | x |
| | Fiat Currency | x | Poorly significant | x |
| | Token Supply | x | Highly significant | x |
| | Token Price | x | x | Not significant |
| | Token service | x | x | x |
| | Token governance | x | x | x |
| | Token profit | x | x | x |
| | Token contribution | x | x | x |
| | Jurisdiction | Significant | x | x |
| | Fintech | x | x | x |
| | Platform | x | Significant | x |
| | Smart contract | Not significant | x | x |
| | Location | x | x | x |
| | Sector | x | x | x |
| | Team number | x | Highly significant | Significant |
| | Verified Team members | x | x | x |
| | Team Background | x | x | Highly significant |
| | Market Sentiment | Highly significant | x | Poorly significant |
| | Vision | x | x | |
| | ICO profile | x | x | |
| | KYC/Whitelist | Not significant | Not significant | Significant |
| | Ethereum return | x | Highly significant | x |
| | Ethereum volatility | x | Not significant | x |
| | Github Pre-ICO | x | x | x |
| | Token retention (%) | x | Poorly significant | x |
| | Ln(SoftCap) | x | Significant | x |
| | Ln(HardCap) | x | x | x |
| ICO_Volume | x | x | x | |
| Number of Advisors | x | Highly significant | x | |
| Verified Advisors | x | x | x | |
| MVP (Prototype) | x | x | x | |
| Marketing Social Media | x | Highly significant | x | |
| Minimum Contribution | x | Not significant | x | |
| Telegram | x | x | x | |
| Escrow agent | x | x | Significant | |
| Expert CEO | x | x | Significant | |
| Gender | x | x | Not significant | |
| Marketplace exchange | x | x | x | |
| Voting rights | x | x | x | |
| Restricted Areas | x | Not significant | x | |

| Article | | ICOs success drivers: a textual and statistical analysis (Paola Cerchiello et al) | Initial Coin Offerings (Paul P. Momtaz) | Why do businesses go crypto? An empirical analysis of Initial Coin Offerings (Adhami et al) |
|-----------------------|------------------------|---|---|---|
| Year | | 2018 | 2018 | 2018 |
| Sample | | 120 | 2131 | 145-208 |
| DataBases | | icobench.com, TokenData.io, ICO Drops.com, CoinDesk.com | icobench.com, coinmarketcap.com, icoalert.com | TokenData.io, CoinMarketCap.com, CoinSchedule.com, CoinDesk.com, IcoAlert.com, ICOBazaar.com, TokenMarket.net, SmithAndCrown.com. |
| Dependent Variables | Success | T | F | T |
| | Amount Raised | F | T | F |
| Independent variables | Patent | x | x | x |
| | Duration | x | Highly significant | x |
| | White paper | Highly significant | x | Not Significant |
| | programming code | x | x | Highly significant |
| | Presale | x | Poorly Significant | Highly significant |
| | Bonuses | x | x | Not Significant |
| | Accepted currency | x | Not Significant | Not Significant |
| | Fiat Currency | x | x | x |
| | Token Supply | x | x | x |
| | Token Price | Not significant | x | x |
| | Token service | x | x | Highly significant |
| | Token governance | x | x | Not Significant |
| | Token profit | x | x | Significant |
| | Token contribution | x | x | Not Significant |
| | Jurisdiction | x | Highly significant | Significant |
| | Fintech | x | x | Not Significant |
| | Platform | x | Poorly Significant | Not Significant |
| | Smart contract | x | x | x |
| | Location | x | x | x |
| | Sector | x | x | x |
| | Team number | Highly significant | x | x |
| | Verified Team members | x | x | x |
| | Team Background | x | Highly significant | x |
| | Market Sentiment | Significant | Significant | x |
| | Vision | x | Significant | x |
| | ICO profile | x | Poorly significant | x |
| | KYC/Whitelist | x | Highly significant | x |
| | Ethereum return | x | x | Not Significant |
| | Ethereum volatility | x | x | Not Significant |
| | Github Pre-ICO | x | x | x |
| | Token retention (%) | x | x | x |
| | Ln(SoftCap) | x | x | x |
| | Ln(HardCap) | x | x | x |
| | ICO_Volume | x | x | x |
| | Number of Advisors | Highly significant | x | x |
| | Verified Advisors | x | x | x |
| | MVP (Prototype) | x | x | x |
| | Marketing Social Media | x | x | x |
| | Minimum Contribution | x | x | x |
| | Telegram | Significant | x | x |
| Escrow agent | x | x | x | |
| Expert CEO | x | x | x | |
| Gender | x | x | x | |
| Marketplace exchange | x | x | x | |
| Voting rights | x | x | x | |
| Restricted Areas | x | x | x | |

APPENDIX 9: EMPIRICAL RESEARCH FLOW.



APPENDIX 11: MANN-WHITNEY U TEST RESULTS (TABLE)

- Test Statistics^a

| | ADJ SoftCap | ADJ Hard Cap | ADJ ICO Price | Token Supply | Raised | PerToINV |
|------------------------|-------------|--------------|---------------|--------------|----------|-----------|
| Mann-Whitney U | 1648.000 | 11833.500 | 3787.500 | 2675.500 | 5209.000 | 394.000 |
| Wilcoxon W | 1819.000 | 13159.500 | 94738.500 | 2885.500 | 5560.000 | 21304.000 |
| Z | -.462 | -1.957 | -2.234 | -2.261 | -2.700 | -2.485 |
| Asymp. Sig. (2-tailed) | .644 | .050 | .025 | .024 | .007 | .013 |

a. Grouping Variable: Status

- **Appendix 11: Mann-Whitney U Test Results (Table)**

Test Statistics^a

| | Accepted Currencies Count | RestrictedCountriesCount | Rating | Team Num | Return | Pre_ICO_Price |
|--------------------------------|---------------------------|--------------------------|----------|-------------------|-----------|---------------|
| Mann-Whitney U | 1122.000 | 246.000 | 5018.500 | 17.000 | 48407.000 | 49357.500 |
| Wilcoxon W | 1242.000 | 282.000 | 5579.500 | 18.000 | 59732.000 | 60682.500 |
| Z | -.941 | -1.189 | -2.491 | -.947 | -6.730 | -5.335 |
| Asymp. Sig. (2-tailed) | .346 | .235 | .013 | .344 | .000 | .000 |
| Exact Sig. [2*(1-tailed Sig.)] | | | | .468 ^b | | |

a. Grouping Variable: Status

b. Not corrected for ties.

Test Statistics^a

| | Pre_ICO_Start | Start Date | Pre_Duration | Duration |
|--------------------------------|-------------------|------------|-------------------|------------|
| Mann-Whitney U | 171.500 | 27985.500 | 157.500 | 34438.500 |
| Wilcoxon W | 667.500 | 33238.500 | 235.500 | 289693.500 |
| Z | -.393 | -4.066 | -.772 | -.252 |
| Asymp. Sig. (2-tailed) | .695 | .000 | .440 | .801 |
| Exact Sig. [2*(1-tailed Sig.)] | .698 ^b | | .446 ^b | |

a. Grouping Variable: Status

b. Not corrected for ties.

APPENDIX 12: CHI-SQUARE TEST RESULTS (TABLES)

Platform * Status

Crosstab

Count

| | Status | | | Total |
|-------------------|--------|--------|----------|-------|
| | Ended | Failed | Upcoming | |
| Platform Ethereum | 466 | 112 | 27 | 605 |
| Other | 391 | 42 | 4 | 437 |
| Total | 884 | 158 | 32 | 1074 |

Chi-Square Tests

| | Value | df | Asymp. Sig. (2-sided) |
|--------------------|---------------------|----|-----------------------|
| Pearson Chi-Square | 29.289 ^a | 4 | .000 |
| Likelihood Ratio | 31.651 | 4 | .000 |
| N of Valid Cases | 1074 | | |

a. 2 cells (22.2%) have expected count less than 5. The minimum expected count is .95.

ADJCategory * Status

Chi-Square Tests

| | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|--------------------|----|-----------------------|
| Pearson Chi-Square | 9.348 ^a | 10 | .499 |
| Likelihood Ratio | 9.510 | 10 | .485 |
| Linear-by-Linear Association | .544 | 1 | .461 |
| N of Valid Cases | 272 | | |

a. 12 cells (66.7%) have expected count less than 5. The minimum expected count is .03.

Location * Status

Crosstab

Count

| | Status | | | Total |
|------------------|--------|--------|----------|-------|
| | Ended | Failed | Upcoming | |
| Location America | 52 | 1 | 0 | 53 |
| Europe | 96 | 13 | 2 | 111 |
| Asia | 56 | 5 | 1 | 62 |
| Africa | 3 | 0 | 0 | 3 |
| Australia | 2 | 0 | 1 | 3 |
| Total | 209 | 19 | 4 | 232 |

Chi-Square Tests

| | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|---------------------|----|-----------------------|
| Pearson Chi-Square | 23.858 ^a | 8 | .002 |
| Likelihood Ratio | 12.940 | 8 | .114 |
| Linear-by-Linear Association | 4.057 | 1 | .044 |
| N of Valid Cases | 232 | | |

a. 10 cells (66.7%) have expected count less than 5. The minimum expected count is .05.

Crosstab

Count

| | Status | | | Total |
|---------------|--------|--------|----------|-------|
| | Ended | Failed | Upcoming | |
| WhiteList Yes | 205 | 62 | 23 | 290 |
| No | 669 | 96 | 7 | 772 |
| No | 10 | 0 | 2 | 12 |
| Total | 884 | 158 | 32 | 1074 |

Chi-Square Tests

| | Value | df | Asymp. Sig. (2-sided) |
|--------------------|---------------------|----|-----------------------|
| Pearson Chi-Square | 62.321 ^a | 4 | .000 |
| Likelihood Ratio | 56.088 | 4 | .000 |
| N of Valid Cases | 1074 | | |

a. 2 cells (22.2%) have expected count less than 5. The minimum expected count is .36.

KYC * Status

Chi-Square Tests

| | Value | df | Asymp. Sig. (2-sided) |
|--------------------|--------------------|----|-----------------------|
| Pearson Chi-Square | 8.544 ^a | 4 | .074 |
| Likelihood Ratio | 11.558 | 4 | .021 |
| N of Valid Cases | 1074 | | |

a. 3 cells (33.3%) have expected count less than 5. The minimum expected count is .33.

Bonus * Status

Crosstab

Count

| | Status | | | Total |
|-----------------|--------|--------|----------|-------|
| | Ended | Failed | Upcoming | |
| Bonus Available | 835 | 157 | 32 | 1024 |
| Available | 49 | 1 | 0 | 50 |
| Total | 884 | 158 | 32 | 1074 |

Chi-Square Tests

| | Value | df | Asymp. Sig. (2-sided) |
|--------------------|--------------------|----|-----------------------|
| Pearson Chi-Square | 8.891 ^a | 2 | .012 |
| Likelihood Ratio | 13.518 | 2 | .001 |
| N of Valid Cases | 1074 | | |

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 1.49.

Bounty * Status

Chi-Square Tests

| | Value | df | Asymp. Sig. (2-sided) |
|--------------------|--------------------|----|-----------------------|
| Pearson Chi-Square | 5.256 ^a | 2 | .072 |
| Likelihood Ratio | 7.489 | 2 | .024 |
| N of Valid Cases | 1074 | | |

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 1.22.

Token Type * Status

Crosstab

| Count | | Status | | | Total |
|------------|-----|--------|--------|----------|-------|
| | | Ended | Failed | Upcoming | |
| Token Type | ICO | 207 | 15 | 7 | 229 |
| | IEO | 40 | 1 | 0 | 41 |
| | STO | 39 | 8 | 0 | 47 |
| Total | | 286 | 24 | 7 | 317 |

Chi-Square Tests

| | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|---------------------|----|-----------------------|
| Pearson Chi-Square | 10.494 ^a | 4 | .033 |
| Likelihood Ratio | 11.425 | 4 | .022 |
| Linear-by-Linear Association | .026 | 1 | .872 |
| N of Valid Cases | 317 | | |

a. 4 cells (44.4%) have expected count less than 5. The minimum expected count is .91.

MVP/Prototype * Status

Chi-Square Tests

| | Value | df | Asymp. Sig. (2-sided) |
|--------------------|--------------------|----|-----------------------|
| Pearson Chi-Square | 7.961 ^a | 4 | .093 |
| Likelihood Ratio | 13.578 | 4 | .009 |
| N of Valid Cases | 1074 | | |

a. 4 cells (44.4%) have expected count less than 5. The minimum expected count is .77.

White Paper * Status

Chi-Square Tests

| | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|--------------------|----|-----------------------|
| Pearson Chi-Square | 5.576 ^a | 2 | .062 |
| Likelihood Ratio | 5.187 | 2 | .075 |
| Linear-by-Linear Association | 2.597 | 1 | .107 |
| N of Valid Cases | 1069 | | |

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.45.

Hype Score * Status

Crosstab

| Count | | Status | | | Total |
|------------|-----------|--------|--------|----------|-------|
| | | Ended | Failed | Upcoming | |
| Hype Score | Very High | 403 | 114 | 23 | 540 |
| | High | 11 | 0 | 0 | 11 |
| | Medium | 100 | 2 | 1 | 103 |
| | Low | 228 | 15 | 4 | 247 |
| | Very Low | 135 | 26 | 2 | 163 |
| Total | | 884 | 158 | 32 | 1074 |

Chi-Square Tests

| | Value | df | Asymp. Sig. (2-sided) |
|--------------------|---------------------|----|-----------------------|
| Pearson Chi-Square | 68.756 ^a | 10 | .000 |
| Likelihood Ratio | 74.578 | 10 | .000 |
| N of Valid Cases | 1074 | | |

a. 6 cells (33.3%) have expected count less than 5. The minimum expected count is .30.

Risk Score * Status

Crosstab

Count

| | | Status | | | Total |
|------------|-----------|--------|--------|----------|-------|
| | | Ended | Failed | Upcoming | |
| Risk Score | | 595 | 134 | 28 | 757 |
| | Very High | 7 | 0 | 0 | 7 |
| | High | 68 | 7 | 1 | 76 |
| | Medium | 152 | 15 | 3 | 170 |
| | Low | 60 | 2 | 0 | 62 |
| | Very Low | 2 | 0 | 0 | 2 |
| Total | | 884 | 158 | 32 | 1074 |

Chi-Square Tests

| | Value | df | Asymp. Sig. (2-sided) |
|--------------------|---------------------|----|--------------------------|
| Pearson Chi-Square | 26.731 ^a | 10 | .003 |
| Likelihood Ratio | 33.528 | 10 | .000 |
| N of Valid Cases | 1074 | | |

a. 7 cells (38.9%) have expected count less than 5.

The minimum expected count is .06.

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