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FROM THE CROWD TO THE MARKET – THE CASE OF SUCCESSFUL CROWDFUNDING CAMPAIGNS FOR TECHNOLOGY PRODUCTS

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Abstract

Although technological innovations foster economic growth, the funding for startups and new projects is limited both from financial and governmental institutions. Due to the funding gap, crowdfunding has become a rapidly growing industry to finance technology projects. This research aims at identifying the determinants of successful technology product delivery after the crowdfunding campaign's funding goal has been reached. Previous research has investigated determinants of reaching the funding goal; however, no research has investigated factors influencing successful product delivery yet.

This exploratory research employs a cross-sectional design to quantify the effects of various factors on successful product delivery. Drawing on a dataset of almost one thousand US-based projects in the category of technology products launched on Kickstarter, it was found that the vast majority of entrepreneurs (92%) deliver the products to the backers. The delivery is, however, often delayed, on average by 80 days. The findings of this research show that the fundraising goal, overfunding achieved, and the number of successful past campaigns were the most important predictors of a successful product delivery. However, availability of schedule, time allocated for the project realisation, successful past campaigns and the funding goal played an important role in delivering the products in the promised time to the backers. Overall, the results signal that for technology products funding related variables have the strongest impact on successful delivery in a timely manner.

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1. Introduction

This paper looks into the determinants of the real success of crowdfunding campaigns in the category of technology products, where real success is considered when the final product has been delivered to the backer. To show evidence of the importance of this paper, in the theoretical part the role of crowdfunding as a means of funding for entrepreneurs is analysed, the lifecycle of a new project is assessed, and benefits of using crowdfunding are reviewed. In the empirical part, the significance of signalling factors that may affect the successful delivery of the product is then investigated.

The insights from this paper is a matter of great importance to potential investors of reward-based crowdfunding campaigns, as more than half of startups and new projects fail within the first year of their existence (Hyder & Lussier, 2016). The main goal is to provide investors with signalling factors that would show whether particular products could reach the market after a successful campaign. However, the findings of this paper can also benefit entrepreneurs as they may spend extra time on activities that could increase their chances of having a successful product launch after getting the needed amount of funding for the project.

The development of technological innovations all around the world facilitates economic stability, growth and new job creation. In the new dynamic markets, startups, as well as existing companies with innovations, foster social and economic growth worldwide. The importance of innovation is also acknowledged by governments who are willing to support these incentives. However, new technology-based startups are exposed to high technology usage, and therefore, to more uncertainties and higher risk. Proof of this is the notoriously high failure rate of these such startups around the world (Cowling, Fryges, Licht, & Murray, 2006; Colombo & Grilli, 2005).

One of the major problems associated with the development of innovations is the existing funding gap, this is where crowdfunding provides solutions for startups and new projects. The funding options for entrepreneurs who are at the early stage of development are limited; they cannot seek funding from venture capitals, large investors or the banking sector as there are some barriers and these funding options are slower and less efficient than crowdfunding platforms in terms of execution. However, in order to establish a scalable and sustainable business and to have a competitive advantage in the long-term, the first stage of seed funding has to be achieved.

In the crowdfunding space, both the startup and investors need to be satisfied, thus, a clear focus, trust, and incentives for both parties are of great importance. When an investor has chosen to invest money in particular projects on a reward-based crowdfunding platform, a tangible or intangible reward is expected in return. In order to gain trust and belief in the project, investors usually look for factors that may signal a positive return on their investment, in the case of crowdfunding, it is receiving the desired product in a timely manner.

Even today crowdfunding is a relatively new type of financing which is growing rapidly. According to Statista (2018), the transaction value growth rate worldwide for reward-based campaigns in 2017 was 54%. Even though the growth rate is slightly decreasing every year, overall the market keeps growing and the number of successfully funded campaigns are expected to grow from 8,830 thousand in 2018 to 17,300 thousand in 2022 (Statista, 2018). Despite the size of the crowdfunding market and availability of funding options, competition for projects is growing, while the quality of projects are decreasing. As a result, investors are spending more time to develop a certain level of trust through their own expertise and careful consideration of actual outcomes (Liang, Wu, & Huang, 2019).

The major crowdfunding market players globally and in the United States are platforms such as Kickstarter, Indiegogo, Patreon, Gofundme, Angel List, Circleup, Tilt, CrowdRise and RocketHub. Currently, reward-based crowdfunding is the fastest growing type of crowdfunding and it has the largest number of online platforms (Massolutions, 2015). According to latest report by Massolution (2015), which tried to estimate the global crowdfunding industry, in 2013 total funding volume was only $6.1 bn and in 2014 it was already $16.2 bn. However, total estimated fundraising volume in 2015 was around $34 bn from which $25 bn was peer-to-peer lending, $5.5 bn reward and donation-based crowdfunding, and $2.5 bn was equity-based crowdfunding. If we look at this based on region, then the biggest shares by total funding volumes go to North America ($17.2 bn), Asia ($10.54 bn) and Europe ($6.48 bn). However, according to Statista (2018), if we look only at reward-based crowdfunding, total transaction value amounts to $9.34 bn in 2018 and this value is expected to grow annually from 2018 till 2022 by a cumulative annual growth rate (CAGR) of 28.8% with expectations to reach $25.75 bn in 2022.

Unfortunately, there is no data available regarding the different categories, such as arts, music, technology, education, etc., to provide a deeper insight into how each category has developed over the past few years. Although it would be valuable to see

how the crowdfunding market has evolved for technology products, as this category is the main focus of my research, there is no such data available.

Before the project is launched, besides choosing the most suitable type of crowdfunding, startups also need to set the size of their initial funding goal for the campaign. The initial capital goal set by funders provides investors with the first impressions about the project and its scale. Furthermore, after the campaign is launched an investor's decision whether to invest or not in the project depends partly on previous contributions to the campaign; people usually tend to invest more in projects which already have been backed by other investors (Burtch, Hong, & Liu, 2018).

The literature on crowdfunding in recent years is growing fast and there are several studies which aim at determining the success factors of crowdfunding campaigns where success is defined as reaching the fundraising goal (Agrawal, Catalini, & Goldfarb, 2014; Angerer et al., 2017; Mollick, 2014). However, reaching the capital goal for the campaign does not necessarily imply a successful product delivery to the backers. In this research, for the first time in literature, I measure the "real" success of crowdfunding projects differently. A campaign is considered successful when the product is delivered to its backers after the initial funding goal for the campaign is reached. There are many cases when projects have met their capital raising goal, but the product has not been delivered to its initial donors. I consider these projects to have failed.

There are several research papers that investigate funding performance and the success factors affecting crowdfunding campaigns in terms of necessary funding reached. However, the topic of success factors of crowdfunding project realisation has not been researched yet. The study of Mollick (2014) is the only research that made an attempt to look at project realisation and product delivery when entrepreneurs decided to get funding through crowdfunding campaigns, however, the primary focus of his paper is to find determinants of successful funding of the project.

In this paper, I aim at understanding what are the determinants of successful product delivery for startups which want to produce and launch new technology products. Therefore, my research question is the following:

RQ: What are the determinants of successful technology product delivery after the crowdfunding campaign's funding goal is reached?

In order to answer the proposed research question, I carry out an exploratory research. In addition to text-mining, I collect data manually; this data serves as an input

for Instrumental Variable (IV) Probit and IV regression models. Almost one thousand successfully funded crowdfunding campaigns for US-based technology products placed on the Kickstarter platform are examined. This sample size is larger than the ones used in previous studies on crowdfunding, however, in different areas (Mollick, 2014; Angerer, Brem, Kraus, & Peter, 2017). The paper focuses on technology products because the creation of new innovative technologies is crucial for the development of the economy for any country in the world. Currently, technology products as a category is the third largest category among all launched campaigns on Kickstarter. The project realisation, due to the complexity of these projects, could take more time as compared to other categories (Kickstarter, n.d.).

This paper is the first to look at successful product delivery in crowdfunding literature in a systematic way. Previous studies investigated the determinants of successful funding of crowdfunding campaigns, the success of the startups, or project realisation in venture capitals (VC) and already established companies (Angerer et al., 2017; Langerak, Hultink, & Robben, 2004; Hyder & Lussier, 2016). Moreover, the sample is the largest one in the literature on crowdfunding. The novelty of this paper also manifests in examining variables that have never been investigated in crowdfunding literature or in any literature on the field. Examples for such novel variables include the number of articles published about the project, additional funding present, comments per backer and number of successful past campaigns.

2. Literature review

In order to find out how particular factors affect the real success of crowdfunding campaigns in terms of delivering the product to the backers, the general idea of crowdfunding is introduced. In the following paragraphs, key findings and previous literature on various factors affecting the success of crowdfunding campaigns are reviewed.

The literature review is structured as follows: First I take a look at previous research papers which consider the concept of crowdfunding, definitions, types of crowdfunding, market size and the main reasons why entrepreneurs choose this particular funding option. The second part of this literature review discusses the success factors of reaching the capital goal of crowdfunding campaigns. Finally, in the third part, project implementation, success factors of project realisation and product delivery are analysed.

2.1 Concept of Crowdfunding

The term crowdfunding originates from two keywords “crowd” and “funding” which explains the concepts of obtaining monetary contribution, ideas, feedback and other means of support from the “crowd” to lead any desired project or activity to realisation. Although crowdfunding originally is seen as part of a broader concept of crowdsourcing that firstly was used by Howe and Robinson (2006), I want to introduce the definition developed by Belleflamme, Lambert, and Schwienbacher (2013, p. 9): “*Crowdfunding involves an open call, essentially through the Internet, for the provision of financial resources either in form of donation or in exchange for some form of reward and/or voting rights*. ”

In contrast to other various types of funding options, such as bank loans, investments from angel investors and venture capital firms, crowdfunding gives entrepreneurs the opportunity to obtain different types of loans via online crowdfunding platforms. This funding option allows capital to be raised without any bank intermediation from large numbers of individuals who each contribute a modest amount of money. At the same time, it is an alternative financing option for people who are looking for ways to allocate their resources depending on their interests, willingness to pay and risk appetite. Generally, crowdfunding models are online web-based platforms which work as intermediaries between individuals or organisations seeking funds and investors looking for ways to diversify their investments (Kirby & Worner, 2014).

In the literature, crowdfunding is divided into four sub-categories depending on differences in capital provided as well as on the rewards promised: (1) donation-based, in which there is no existential reward or financial return from contribution; (2) equity-based, in which a shareholding contract is involved, meaning that backers gain equity by providing capital in business that has launched the campaign; (3) lending-based that generally is based on a peer-to-peer lending contract which includes interest payments over a predetermined timeline; and finally there is (4) reward-based crowdfunding which is the most widely used crowdfunding type. It can be considered as a form of support where the monetary contribution of investors is exchanged into certain rewards, such as products, early access to services or new experiences (Kirby & Worner, 2014).

According to Angerer et al. (2017), the main benefits of crowdfunding campaigns for entrepreneurs are capital collection, marketing effect and community effect. Startups choose to get funds from the crowd generally because they face difficulties when trying to receive funding from other traditional financing sources.

Belleflamme et al. (2013) states that crowdfunding is not only about reaching the capital goal, it is also about information, getting public attention and instant feedback on a particular product or service. As argued by Larralde and Schwienbacher (2010), it is a tool to generate an early hype about the product before the company is physically up and running, and to have a market test for recently launched companies or for already existing ones who just want to test their new product.

In addition, Mollick (2014) also states that the goal of the crowdfunding effort is not only capital raising, especially in the context of entrepreneurship. There are various reasons why an entrepreneur could consider crowdfunding as an option, for example, crowdfunding campaigns can be used as a tool of proof to get necessary funding from other traditional financing sources. That is, the campaign is created for market testing purposes in order to show that there is an existing demand for the selected product or service. The case of Pebble "smart watch" could be mentioned as an example of this kind of usage of crowdfunding campaigns; a project which did not receive funding by venture capital (VC). However, after a very successful campaign on Kickstarter, the company was able to get a large amount of VC funding (Dingman, 2013). As of now, this case is also considered as one of the most successful crowdfunding campaigns of all time (Statista, 2018).

However, Kleemann, Gunter, and Kerstin (2008) believe that companies choose crowdfunding mainly because of cost reduction. While making donations to the project, backers create value for the company without any costs and help to reduce the length of time and monetary resources spent on marketing activities. Campaigns are an effective and cheap technique to introduce the market to the mission and vision of the company. Also, they increase the speed of reaching multiple channels and allow to track affiliated traffic to the website and campaign itself.

Having discussed the advantages and benefits of crowdfunding campaigns, disadvantages and risks should also be considered. There can be some consequences of regionality and geography due to cultural and linguistic differences between nationalities. Lending-based crowdfunding campaigns have shown a tendency of "home bias", investors prefer investing in projects located in the same geographic area as they are. This tendency is present even though investors miss greater alternative investment opportunities with lower risks and higher returns in more distant geographic locations (Lin & Viswanathan, 2016). However, investors may prefer borrowers and startups from developing countries only if they can stand out from the crowd (Galak, et al., 2011).

Furthermore, disclosure risk should be considered from the project creator's perspective because besides disclosing crucial information about the product or service, creators also need to disclose information, such as strategy, development process, key employees, customers and related costs to productions, which may have a negative effect on future negotiations with potential suppliers (Kuti & Madarász, 2014). Additionally, due to a large number of investors, entrepreneurs need to deal with investor management which includes dealing with strong personalities, comments, attention and interactions with them (Agrawal et al., 2014).

Besides the previously mentioned risks, crowdfunding investments may come with numerous other risks, such as potential business failure, money laundering schemes, scandals for various security markets, illiquidity for investors due to lack of secondary market, not enough experienced entrepreneurs, risks from compliance and issues from a regulation perspective (World Bank, 2013).

2.2. Success factors of reaching the crowdfunding goal

The funding performance and success factors of crowdfunding campaigns is another topic that has gained a great interest in crowdfunding research. Whether the project will succeed in reaching the funding goal or not will further affect the real success of the project. Without the needed resources there might be no further development at all. Moreover, talking about project launch and the real success when the product has actually reached the end user, all the factors that affect the success of reaching the initial funding goal indirectly affect the real success of the crowdfunding campaign.

When an entrepreneur starts their own crowdfunding campaign, there are many things that should be considered in order to compete with other projects and to stand out from the crowd. However, in most cases, the entrepreneur needs to figure out how to be noticed using limited resources and time in order to succeed and reach the funding goal set for the campaign. As there are various factors that need to be taken into consideration, in this section, I review the determinants of successful crowdfunding campaigns where the funding goal was reached.

Funding goal and duration of the campaign

The size of the funding goal is one of the most important determinants for the success of projects. According to existing studies, a higher capital goal for projects leads to a lower probability of successfully reaching the funding goal (e.g., Mollick, 2014; Agarawal et

al., 2013; Belassi & Tukel, 1996). Mollick (2014) states that smaller projects have a higher probability to reach their capital goal because of possible self-funding by campaign creators. This situation can be present in cases when a crowdfunding platform, such as Kickstarter, operates with an "all-or-nothing" strategy, meaning that projects get financing only when the capital goal is met. In these cases, self-funding can be made by the founders themselves to contribute the difference between the money already pledged and expected funding goal.

Previous research about the duration of the financing project has quite mixed empirical results. Koch and Siering (2015) claim that duration has a positive impact on the money that is raised for the project because it increases the probability for the campaign to be noticed by more investors. In contrast, Mollick (2014) claims that a longer duration should have a lower probability of success due to signals of lack of confidence. Nevertheless, Cordova, Dolci, and Gianfrate (2015) who studied crowdfunding campaigns for technology products also found a positive correlation between the length of the campaign and the success rate.

Quality of the project

The general quality of the project and updates during the campaigns significantly increase investors' trust, thus, also increasing the possibility to reach the capital goal (Mollick, 2014). In his research, Mollick (2014) looks into spelling mistakes in textual descriptions which might signal the low preparation level of the entrepreneur for the campaign as well as for the overall product development strategy. He found that a higher number of spelling mistakes are associated with lower success levels of campaigns. Moreover, this approach is supported by Cabral (2012) who analyses the phenomenon of reputation on the Internet and how various activities such as grammatical correctness may have a bad impact on campaign effectiveness.

Additionally, Vachelard, Gambarra-Soares, Augustini, Riul, and Maracaja-Coutinho (2016) found that factors, such as multimedia content and visual materials (e.g. photos, videos, etc.) increase the probability of launching successful campaigns.

Networking and social media

Several studies show that the founder's network has a significant and positive effect on the success rate of a project (Agrawal et al., 2011; Giudici, Guerini, & Lamastra, 2013; Byrnes, Ranganathan, Walker, & Faulkes, 2014). The number of connections is of great importance as friends and family are usually considered as the first funding option, they

might also be the ones that help reach the desired goal. Also, various social networks, such as Facebook, Twitter, etc. are considered as a great place where founders can spread the word about ongoing projects and share information about crowdfunding campaigns in order to bring awareness of the product or service to the target audience and at the same time to get needed support form a larger crowd.

In contrast, Etter, Grossglauser, and Thiran (2013) in their research study the success of crowdfunding campaigns in Kickstarter based on two groups of determinants: (1) the time-series of money-based predictors, such as the funding goal, duration of the campaign, pledged money, number of backers, etc. and (2) social predictors, such as number of tweets, replies and retweets, and others. The conclusion of the authors was that time-series determinants are more valuable and can predict the success of crowdfunding campaigns with higher accuracy than social determinants.

Other factors

Belleflamme et al. (2013) in their research found that projects which produce tangible assets perform better and they attract more capital than projects that offer services. Also, non-profit crowdfunding campaigns usually are more successful in raising funds for their projects.

There are some other factors that could be considered in order to understand the likelihood of reaching the desired goal. Previous papers have investigated the importance of geographical locations, past success in previous campaigns, comments during the campaign, updates from the entrepreneur, minimum investment and competition (Xu et al., 2014; Lin & Viswanathan, 2016; Galak, et al., 2011).

2.3. Success factors of project realisation

Product or service development always starts in the company and money fundraised is only a tool to lead the project to success. Thus, an effective product launch can depend on various factors, such as a cross-functional team, the quality of the project, logistics, timing of the launch and other internal as well as external factors. A product launch can occur in two different scenarios - the company already has been operating for several years and is developing a new product or there is a completely new startup which is only just on its path to begin its operations (di Benedetto, 1999; Zhao, Libaers, & Song, 2015). Nevertheless, a product or service launch in a project unit as well as in a business unit level is quite challenging even with a sufficient amount of financial resources.

There are different ways of how to categorise all of the success factors of project realisation. One of the methods is to group them in management related, project related, organisation related, project manager's performance on the job related and finally external environment related factors that may lead to success or failure of the particular project. This classification of critical success factors was developed by Belassi and Tukel (1996) who describe the impact of all these factor groups on project performance. A similar categorisation was also later used in the study of Tukel and Rom (1998) in which six common success factors were introduced: (1) support of top management; (2) client consultation; (3) performance of project management; (4) preliminary estimates; (5) availability of resources; and (6) other factors.

Product development has been a relevant research topic for more than a decade. Most of the research done in this area is focused on project realisation in already established companies or in startups after necessary funding is achieved through venture capitals or self-funding, however, there is no literature about project realisation in crowdfunding. Therefore, to get a general idea about the complexity of project realisation, the following paragraphs review all factors that can influence the success rate and an overview of existing literature is provided. In order to have a structured way of analysing all the factors that may lead to the success of a particular project, I categorise them into four groups: (1) Product related factors; (2) Expertise, skills and commitment related factors; (3) Funding related factors; and (4) Other factors (Cooper, 1985; Belassi and Tukel, 1996).

Product related factors

The product itself should be considered as one of the most important elements as it is carried out with difficulties and uncertainties for entrepreneurs. In 1985 Professor Robert G. Cooper developed the NewProd model for screening new products in order to predict the probability of success for new product realisation. He found a total of eight critical factors which have a significant impact on new product implementation and outcome. The key factors or dimensions that he uses in the NewProd model are (1) product superiority, quality or uniqueness; (2) overall company/project compatibility; (3) market needs, growth and size; (4) economic advantage to the user; (5) newness to the firm; (6) technological resource compatibility; (7) market competitiveness; and (8) product scope (Cooper, 1985). This model was employed by the author numerous times to identify potential winner and loser projects (Cooper, 1992; Cooper & Kleinschmidt, 1993).

According to Montoya-Weiss and Calantone (1994), market environmental factors such as market needs, consumer acceptance and market competitiveness is of great importance. As argued by Kromidha and Robson (2016), in order to develop understanding about possible market demand, the level of interest from the public before the actual product launch can be considered as a good proxy for market needs and the potential size of it.

Additional factors that drive a new product's success are technological/ manufacturing synergies, product advantage and proficiency of technological activities (Cooper & Klenschmidt, 2007). Lynn, Skov and Abel (1999) claim that competition and speed of being able to adapt to technological change are very crucial. It should not be treated as a luxury but rather as an economic necessity. Developing a complex product in an efficient way and being able to implement improvements quickly have a considerable impact on the product launch and its further development (Lynn et al., 1999; Alvarez & Barney, 2001).

Expertise, skills and commitment related factors

The entrepreneurial experience of the founding management, the commitment of the team and their competence are as crucial as factors related to product or organisation (Belassi & Tukel, 1996; Song, Podoynitsyna, Van der Bij, & Halman, 2008). Support of the top management is one of the key elements to having a result driven and enthusiastic team that would strive for constant improvements to achieve the success of the new product. Initiatives that come from management also assure sufficient allocation of resources and respective performance. In order to effectively implement new product launch activities, employees involved in the development process, as well as their professional competence, is critical (Kuester, Homburg, & Hess, 2012; Langerak, Hultink, and Robben, 2004).

Delmar and Shane (2003) and Kirsch, Goldfarb, and Gera (2009) found that, in order to set the right funding threshold, to raise a proper amount of money and to lead the project to the market, some significant foreknowledge about budget creation and internal process scheduling is needed for these entrepreneurs. Previous entrepreneurial experience of the founding team with a new product launch would also avoid putting crowdfunding campaigns at the risk of failure or delayed deliveries (Van Gelderen, Thurik, and Bosma, 2005).

The role of a new product strategy, how it is communicated and how explicit it is, according to Cooper and Kleinschmidt (2007), shows the overall strategy and focus

of the company during the development process. Additionally, it may indicate corporate capability, resource availability and how the entrepreneur structures the implementation of various processes. As argued by Tukel and Rom (1998), a predetermined schedule and business plan for the product development also indicates skills and the level of expertise of top management, thus, there is a higher possibility to succeed in the market (Miner & Raju, 2004).

According to Cooper and Kleinschmidt (2007), communication between departments, a good leader and structured daily tasks in an organisation may yield better performance, and therefore, better results. Also, Bonner, Ruekert, and Walker (2002) claim that sufficient size of the entrepreneurial team which consists of people from different competence areas increases project innovation and success rate; the bigger the size of the founding team, the greater the talent (Song et al., 2008). Besides the level of competence for the entrepreneurial team, years of operation for the company since its foundation has a positive impact on the success of the startup (Haltiwanger, Jarmin, & Miranda, 2010).

Funding related factors

There is no doubt that without necessary funding project launch is not even possible, thus, any additional chance to get extra financing is truly appreciated within the company. According to Mollick (2014), whose findings goes in line with the conclusions made by Brown and Eisenhardt (1995) in their research about product development, projects that have enough resources and are overfunded are able to increase the speed and quality of delivering the product or service to the end user with additional funding available. However, there might be situations when additional funding is attracted in order to help the project survive in difficult times. This can be present in cases when the project itself is quite complex or when founders did not expect such a high level of success for the project which initially was planned to be carried out on a smaller scale or in a different scope.

However, funding related factors are closely connected to the competence of top management to have an efficient allocation of resources and a well-planned strategy for the particular project launch (Kuester et al., 2012).

Other factors

Besides the factors mentioned above, there are various external and environmental factors that may have an effect on the success rate of project realisation and which are

hard to measure. These factors include economic and political situation, competition intensity, entry barriers, recognition by media or journals, over which the entrepreneur has little control (Cooper, 1999; Song et al., 2008).

2.4. Success factors of crowdfunding projects

Although project implementation after a successfully funded crowdfunding campaign is very crucial for backers who invest in reward-based campaigns, there is not that much research done in this field so far. A study done by Mollick (2014) is the first academic paper which, besides looking at success factors that may affect the result of crowdfunding campaigns, also made the first attempt to evaluate campaign success in terms of whether the project has been completed and the product delivered to the backers in a timely manner. Also, this study is the closest one to my research. In order to analyse outcomes of crowdfunding campaigns, Mollick (2014) used a dataset of 381 campaigns for technology and design products/services launched on Kickstarter which have made a promise to deliver a particular good or service to its backers before July 2012. He found that 316 of these projects promised to deliver final products but 65 of them offered giveaways. Also, only 3 projects issued refunds, 11 did not respond to their backers after a failure, and in total only 14 of all 381 products did not succeed at all which is around 3.6%.

Statistics from this research show that 24% of 247 that produced goods delivered on time, 33% have not made a delivery yet but might do within the set deadline and the rest of them had a delay on delivery. Molllick (2014) in his research found evidence that the size of a project, high expectations and larger funding percentage have a strong effect on delays. Also, larger projects have a higher probability of late deliveries.

3. Methodology

3.1 Sample of crowdfunding campaigns

In order to answer the research question and to provide insights into the largest crowdfunding markets in the world, I have chosen to analyse US-based projects. All of the information about crowdfunding campaigns for technology products are obtained from Kickstarter – one of the largest and dominant global crowdfunding platforms. However, additional financial information about the companies is collected from Crunchbase which is a platform used for finding more detailed business information about private and public companies mostly in the US. For this research, Kickstarter has been chosen as the main crowdfunding platform because:

(1) This platform is the world's largest funding platform for creative projects, such as art, design, innovative technology, music, theatre, games, etc. (Nguyen, 2018);
(2) All of the campaigns are funded on an "all-or-nothing" basis, meaning that a campaign is successful and the entrepreneur receives the money only when the capital goal is met;
(3) Detailed information about previous already closed crowdfunding campaigns is available on the platform, such as details about founders, collaborators, product, updates, comments, delivery, etc.;
(4) This platform is US-based and most of the projects are developed and launched there. Also, additional financial information about these startups is publicly available and can be obtained from Crunchbase.

Crowdfunding platform Kickstarter was established on April 28, 2009, and since then it gives entrepreneurs the opportunity to raise funds by getting needed support from individuals who are ready to invest in projects to help entrepreneurs lead innovative projects to realisation. In most cases, individuals who invest in those projects do not have intentions to financially profit from them. Thus, all projects on their platform are reward-based campaigns, offering different kinds of products or experiences in return of the investors' money. The platform itself makes money by applying a 5% fee from the fundraised capital from campaigns which have been successfully funded (Kickstarter, n.d.).

Since the launch of the company, investors have pledged around $4 billion to Kickstarter campaigns in total and have successfully funded 154 thousand projects from

around 15 million people. At the same time, $775 million have been pledged towards technology products and in total 36,664 projects have launched on the platform as of 10 November 2018. The success rate of the campaigns was 20.1% which is the lowest rate in comparison with other categories on Kickstarter (Kickstarter, n.d.).

Data collected for this research includes Kickstarter campaigns that fulfil the following criteria: (1) companies are located in the US; (2) projects are for technology products launched between 2013-2018; and (3) they have successfully reached their funding goal as this research focuses on project implementation after the capital goal is met.

The sample size is limited by the inclusion criteria, however, as of 10 November 2018, it includes 4,279 projects from which 75 have reached more than $1 million pledged towards their campaigns (Kickstarter, n.d). Excluding projects due to missing data, such as the shipping date of the product, in this research, a sample of 941 technology product crowdfunding campaigns is analysed. This sample size is larger than the ones used in previously discussed papers, such as Mollick (2014), Angerer et al. (2017), thus, giving the possibility to develop better insights into the industry and into business development itself.

3.2 Variables

As this research has an exploratory research design, which facilitates the study of a problem which has not been researched much before and it does not intend to provide conclusive evidence to existing studies, no formal hypotheses are introduced. However, expectations based on existing literature from similar but slightly different areas are proposed. In the following paragraphs, the importance of all variables and their usage in this study is analysed, while categorising them into three groups: (1) dependent variables; (2) independent variables; and (3) control variables.

3.2.1 Dependent variables

The first dependent variable used for analysis is *Success* which is a binary variable and it indicates whether the product or service has been shipped or the entrepreneur has failed in delivering it to its initial backers. The project is considered successful if a refund was never mentioned among the comments and a refund has not been announced by the entrepreneur in the updates section of the campaign. However, the project is defined as failed if two conditions are met at the same time: (1) ratio *number of refund*

requests among the comments/*number of comments after the campaign closure* is larger than 10%, and; (2) ratio *number of refund requests among the comments*/*number of backers for the campaign* is larger than 5%.

This paper is the first one to define failed crowdfunding projects which is not a straightforward exercise. The methodology applied is validated by checking manually all projects categorised as failed based on two criteria. Even though the selected threshold might seem low for the first sight, had we set the threshold higher, we would have missed identifying many failed projects. For example, if the threshold for both ratios is set around 40% - 60%, only 10 out of 941 projects would be considered as failed, which is far from reality. Even with these rather low thresholds, there might be a few failed projects beyond the set thresholds for both criteria. Nevertheless, the ones categorised as failed in the sample are surely failed projects; they were all checked and verified manually. The projects that are in "grey area", meaning these projects did not fail and were neither successful, are excluded from the sample. The second dependent variable is *Late delivery* of promised product or service that is measured in days, it shows how many additional days the entrepreneur needed to make a successful delivery as compared to the estimated delivery, see Table 1.

Table 1. List of dependent variables

Variable	***Name***	***Description of how the variable is constructed***
Success	*Success*	Binary=1, if the company has delivered the product to its initial backers, 0=otherwise.
Delivery Time	*Late Delivery*	Number of days between estimated delivery date and actual shipping date.

Source: Created by the author.

3.2.2 Independent variables

In order to find the most critical independent variables, I rely on the factors used by Kromidha and Robson (2016) and Belassi and Tukel (1996) who researched signalling factors in online crowdfunding. Similarly to these authors, who for project management they define factors related to success/failure of project implementation, I categorise independent variables in three groups: (1) product related factors; (2) expertise, skills, commitment related factors; and (3) funding related factors.

Product related variables

One of the product related factors that I have chosen is *Price of the product,* which might signal the complexity of the product as the price usually consists of production, marketing, R&D and other costs, plus additional profit to the startup and its employees to keep the business running. For simplicity, I have chosen the early bird price if provided, and the standard price of the product/service otherwise (Cooper, 1985). Also, *Time for the project realisation* as a product related factor is included, as it again signals the complexity of manufacturing the product and development processes within the company; the larger the time, the more complex the product is. This variable is calculated as the time between campaign ending date and estimated delivery date which is needed for the entrepreneur to launch the project, similarly to Cooper (1985).

Another factor that is very crucial and can be used as a proxy for the demand of the product or service is *Comments per backer* which can be considered as a signalling factor showing interest in the project as well as an eagerness to receive the final product (Kromidha & Robson, 2016). However, in this case, only the number of comments posted by current or potential backers until the campaign is closed are used because there might be cases when there are a lot of comments posted after the campaign closure because of various concerns from backers. This might happen when the project launch has been unsuccessful, thus, a lot of backers are requesting a refund in the comment section.

Additionally, as a signalling factor for recognition, uniqueness and demand, the number of *Articles published* about the project by numerous media channels and publishers is added, which might be a huge stepping stone for a startup at an early stage. There are a number of well-known publishers who write about new innovative companies. However, for example, articles created by a publisher such as TechCrunch is more valuable than others, as TechCrunch makes publications only about projects which they have found outstanding and unique enough.

Here most of the variables introduced have never been investigated in the literature before, thus, proxies for complexity and demand from different research areas are used. Even though I do not develop any formal hypotheses, some prior expectations with expected signs based on previous literature (see arguments above) are introduced, see Table 2.

Table 2. List of product related variables

Variable	***Name***	***Description of how the variable is constructed***	***Expectations***	
			Success	***Late Delivery***
Price of the product	*Price*	The early bird price of the product in USD.	-	+
Time for the project realisation	*Production*	Number of days between campaign ending date and estimated delivery date.	-	+
Comments per backer	*Comments per backer*	Number of comments posted by current or potential backers until the campaign is closed per backer.	+	-
Articles published	*Max articles*	Number of articles published about the project according to Crunchbase and information provided by the entrepreneur in the main page of the campaign.	+	-

Source: Created by the author.

Expertise, skills and commitment related variables

One of the factors that I choose in order to indicate a company's experience is *Years in business* as it shows knowledge already acquired and experience with the product development starting from the company's foundation until the first prototype made and product delivered (Belassi & Tukel, 1996; Haltiwanger et al., 2010). Also, one of the factors that I add and may evidence professional competence and previous experience with new and innovative product development as well as with crowdfunding campaign launches for fundraising purposes, is the number of *Successful past campaigns* in terms of successfully reached funding goal (Van Gelderen et al., 2005).

However, as the team of the company is also highly important, the number of *Employees* is included. It indicates knowledge power in the company, especially if there are more people working on one product. A larger team may increase the probability for the project to reach the market at a higher quality (Belassi & Tukel, 1996).

In order to see the ability of the entrepreneur to create a feasible strategy for the new product, as well as to see the commitment and skills of the entrepreneurial team to plan the further development and production process, *Schedule* availability for potential backers during the campaign is also included as an independent variable. This variable was listed as crucial for successful project realisation, see section 2.3 (Belassi & Tukel, 1996; Miner & Raju, 2004). According to Tukel and Rom (1998), this factor shows how skilled and knowledgeable the top management is.

As the number of *Updates* posted for the project during the campaign both before and after the campaign has ended might indicate commitment from the creator's

side and effort that has been put into the project, this variable is also included as an independent variable. It also shows how transparent the company is about its entrepreneurial development process and how much it is ready to share with its backers (Kromidha & Robson, 2016).

Previous experience, skills and commitment all together show the capability and strengths of the company, thus, intuitively it is to be expected that all the variables included in the regression positively affect *Success* and decrease the number of days for *Late Delivery*, see Table 3. For some variables (i.e. *Years in business, Updates*) the expected sign is based on previous literature (see arguments above), while for the ones introduced for the first time (i.e. *Successful past campaigns, Schedule, Employees*), the expectations are in line with intuition.

Table 3. List of expertise, skills and commitment control variables

Variable	***Name***	***Description of how the variable is constructed***	***Expectations***	
			Success	***Late Delivery***
Years in business	*Experience*	Number of years in business, which is the time between the date of the company's foundation and project launch date.	+	-
Successful past campaigns	*Successful Campaigns*	Number of successful past campaigns in terms of funding created by the owner of a project.	+	-
Schedule	*Schedule*	Binary=1, if company has a published detailed schedule of development for the project, 0=otherwise.	+	-
Updates	*Updates*	Number of updates for the project posted.	+	-
Employees	*Team*	Number of employees in the company.	+	-

Source: Created by the author.

Funding related variables

In order to see how financially capable the company or entrepreneur is that is launching the campaign, at first, I choose *Funding goal* and *Overfunding achieved* as these variables may impact the product delivery. *Funding goal* set for the campaign shows the funding needed for the project in order to continue the project's development and it signals the scale of the overall project; the higher the funding needed, the larger, more complex and costly the project (Mollick, 2014; Hauge & Chimahusky, 2016).

Overfunding achieved shows the recognition and demand for the proposed product/service, however, it might also signal an incorrect estimation of the possible scale in which the company could grow relying on the market size and needs. If the level of *Overfunding achieved* is quite high, it means that there is either a high demand

for this product or the threshold set for the campaign was underestimated (Cooper, 1985; Mollick, 2014). Projects that tend to achieve higher overfunding may experience problems with execution due to unexpected success and increased expectations. Also, change in initial plan can be compounded if the higher funding leads to increased complexity and scope of the project (Mollick, 2014; Mollick & Kuppuswamy, 2014).

Additional funding ratio which shows additional funding available for the entrepreneur should be considered as it increases the monetary capability to lead the project to production and further to actual launch in the market as there might be additional funds from other sources available to push the project faster towards realisation (Belassi & Tukel, 1996). Additionally, the number of *Funding rounds* may indicate the company's availability to resources and its ability to raise funds through different sources which can also indicate that the product is unique enough and there is a demand for it in the market (Tukel & Rom, 1985), see Table 4. However, it can also send signals that the entrepreneur lacks resources to launch the product or service.

In most cases, it is expected that the higher the *Funding goal* and *Overfunding achieved* for the entrepreneur, the lower the probability of overall success for the project and for successful delivery in a timely manner due to increased complexity and unexpected success of the project (see arguments above). However, as already discussed, variables related to additional funding for the project are uncertain and may signal different outcomes in different situations. As a result, it is hard to establish certain prior expectations, see Table 4.

Table 4. List of funding related variables

Variable	***Name***	***Description of how the variable is constructed***	***Expectations***	
			Success	***Late Delivery***
Funding goal	*Funding goal*	The size of capital goal set for a project in USD.	-	+
Overfunding achieved	*Overfunding*	The size of overfunding achieved at the end of campaign (pledge/goal) in %.	-	+
Additional funding ratio	*Add funding ratio*	Ratio of Additional funding available (in USD) / Funding goal (in USD)	+/-	+/-
Funding rounds	*Fund rounds*	Number of funding rounds untill product/service delivery date.	+/-	+/-

Source: Created by the author.

3.2.3. Control variables

Besides independent variables, there are also other factors which should be controlled during the research. In order to account for the economic situation in the country, I

choose the *Dow Jones Industrial Average (DJIA) Index* closing value at the end of the crowdfunding campaign as a benchmark for the economy. The DJIA index is a good market indicator of U.S. equities which is constructed as the arithmetical average of the stock prices of the top 30 U.S. companies. It highly correlates with other large stock market indices, such as NASDAQ and S&P 500. It is the most widely cited and used market index in the internet, newspapers and research and it captures the general state and sentiment of the economy (S&P Dow Jones Indices, n.d.). As the DJIA index is used as a proxy for the state of the economy that indicates the trend of the current market, higher index signals equal a better economic situation in the country.

In a favourable economic situation, higher *Success*s and lower chances of *Late delivery* are expected, as in general people have more money to invest, the sentiment in the economy is positive, and demand for goods is also higher which stimulates the entrepreneur to deliver the product on time, see Table 5.

Table 5. List of control variables

Variable	***Name***	***Description of how the variable is constructed***	***Expectations***	
			Success	***Late Delivery***
Dow Jones Industrial Average Index	*Dow Jones Index*	Dow Jones Industrial Average (DJIA) Index closing value at the end of campaign.	+	-

Source: Created by the author.

3.3 Data collection

The variables used for analysis in this research are gathered from descriptions, comments and information from the updates sections on the websites of both Kickstarter and the company. Financial information which is publicly available about project creators is obtained from Crunchbase and Orbis. Financial data about the economic state is collected from Thomson Reuters Eikon information service.

Data is extracted either using tools available on the Internet for gathering data from the campaign descriptions or text mining code that was specifically designed for this research to collect the necessary information from Kickstarter.

Firstly, a text-based analysis is applied as most of the information available about crowdfunding campaigns are in descriptive text format on the website. The information needed for the dataset can be collected through descriptions of the project, comment section, updates, founder details, etc. In order to collect all information about variables in an efficient way, a specific text-mining coding model is designed which

goes through the publicly available information of each campaign and stores the gathered data in an Excel database. However, in order to find the information about variables, such as date of foundation, additional funding present, the number of articles published and the team size, data for these variables is collected manually by going through each and every campaign and looking for this information in various online sources. In case of missing data, the mean-substitution approach has been employed, being considered as the most valid approach in the literature (Raymond & Roberts, 1987).

Secondly, after all the necessary information from the website is obtained, then it is structured, adjusted for the research's purposes and used in regression analysis. This method with the text-mining and further quantitative analysis is also used in the paper by Kunz, Bretschneider, Erler, and Leimeister (2017), in which the authors were investigating signals that may lead to successfully funded projects in reward-based crowdfunding. To support text-mining in academic research, Fan, Wallace, Rich, and Zhang (2006) claim that text mining is one of the best ways to use computers to process large volumes of text at high speeds.

3.4. Regression analysis

Firstly, in order to see what is the relationship between all the variables used in this research, the correlation matrix is determined. A high correlation between variables renders the reliability of the estimates if not excluded from the sample.

Afterwards, I check for outliers in the dataset using histograms which is a very useful tool to understand the distribution of a variable. At the same time, horizontal box plots are drawn which also help to examine the distribution of variables. When outliers are detected, the winsorization technique is applied, which means that the values of variables that are above the particular confidence interval are replaced with the less extreme values of this particular percentile. Essentially, this technique allows extreme values to be moved closer toward the centre of distribution. In statistics, the mean and variance are sensitive to outliers and winsorization is an effective way to deal with this problem and it does not require removing or trimming observations from the current dataset (Dixon, 1960).

For further analysis, an Instrumental Variable (IV) Probit regression model is applied which is a regression model commonly used when there is a binary dependent variable and at the same time, there are endogenous regressors that correlate with error

term (Stock & Watson, 2003). This model is used in previous papers that study success factors of crowdfunding campaigns, for example, by Cordova et al. (2015). The authors employ this model to see the probability of a project succeeding in terms of reaching the funding goal through a crowdfunding campaign. As my research aims at investigating the probability of real success for technology startups in terms of delivered product to the backers, IV Probit model is chosen as it shows whether particular variables increase or decrease the probability of success. However, as the necessary regression includes endogenous variables, firstly, I estimate a two-stage least-squares (TSLS) model considering instrumental variables and their effect on the respective variable.

The model of IV Probit regression function is as follows:

$$Pr\{Y_i = 1|\, X_i\} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_i X_i + \beta_{i+1} y_{2i} + u_0 \quad (1)$$

$$y_{2i} = \Pi_0 + \Pi_1 Z_1 + \Pi_2 Z_2 + v_0 \quad (2)$$

In equation (1), *Pr* denotes the probability of a campaign successfully delivering the product to its backer (Y_i=1). X_i is a vector of variables; in this research they are signaling factors that may influence project realisation, hence, successful delivery of the product for individual projects *i*(*i*=1,2, … , n). β_0 is the constant in this regression; it stands for the case when all coefficients and covariates are set to zero (0). B_i are coefficients that correspond to the probability of being 1, while *u* is the residual.

In equation (2), y_{2i} is a vector of endogenous variables and Π_i is a vector of additional instruments. In this research these variables do not depend on the entrepreneur and they have no direct impact on the dependent variable.

Considering all independent variables, the final IV Probit model is as follows:

$$\begin{aligned} Pr\{Success_i = 1|X_i\} &= \beta_0 + \beta_1 ln\_Funding\_goal_i + \beta_2 Additional\_funding\_ratio_i \\ &+ \beta_3 Price\_of\_the\_product_i + \beta_4 Time\_for\_the\_project\_realization \\ &+ \beta_5 Years\_in\_business_i + \beta_6 Schedule_i \\ &+ \beta_7 Successful\_past\_campaigns_i + \beta_8 Updates_i + \beta_9 Employees \\ &+ \beta_{10} Funding\_rounds_i \\ &+ \beta_{11} ln\_Overfunding_i + \beta_{12} DowJonesIndex_i + u_0 \end{aligned} \quad (3)$$

$$ln\_Overfunding_{2i} = \Pi_0 + \Pi_1 Articles_1 + \Pi_2 Comments\_per\_backer_2 + v_0 \quad (4)$$

All these variables were defined in section 3.2.2. In equation (3) variables that depend on the entrepreneur, thus, directly have an impact on the entrepreneurial team are included. In equation (4), two variables are chosen as instrumental variables as they do not affect the success of crowdfunding campaigns directly and these factors cannot be influenced by the entrepreneurs themselves.

As my research also aims at investigating how particular variables affect delayed product deliveries, in order to account for *Delivery time* for successful projects (*Success=1)* and to determine the factors that influence the late delivery of products to its backers, I run an IV regression model where *Delivery time* is the dependent variable.

The model of IV regression with instrumental variables is as follows:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_i X_i + \beta_{i+1} y_{2i} + u_0 \quad (5)$$

$$y_{2i} = \Pi_0 + \Pi_1 Z_1 + \Pi_2 Z_2 + v_0 \quad (6)$$

This regression is very similar to equations (1) and (2) as it has the same endogenous variables captured by the same instruments. The only difference is the dependent variable which is continuous in this latter case. As a result, a simple regression model with instrumental variables is used (equations (5) and (6)).

Considering all independent variables, the final IV regression model is as follows:

$$\begin{aligned} Delivery\ Time_i &= \beta_0 + \beta_1 ln\_Funding\_goal_i + \beta_2 Additional\_funding\_ratio_i \\ &+ \beta_3 Price\_of\_the\_product_i \\ &+ \beta_4 Time\_for\_the\_project\_realization + \beta_5 Years\_in\_business_i \\ &+ \beta_6 Schedule_i + \beta_7 Successful\_past\_campaigns_i + \beta_8 Updates_i \\ &+ \beta_9 Employees + \beta_{10} Funding\_rounds_i \\ &+ \beta_{11} ln\_Overfunding_i + \beta_{12} DowJonesIndex_i + u_0 \end{aligned} \quad (7)$$

$$ln\_Overfunding_{2i} = \Pi_0 + \Pi_1 Articles_1 + \Pi_2 Comments\_per\_backer_2 + v_0 \quad (8)$$

The Variance Inflation Factors (VIF) test is performed to check for multicollinearity. If the VIF test reveals variables with values larger than 5, then these variables should be excluded due to multicollinearity (Rogerson, 2001).

4. Analysis and discussion of results

The first part of this section shows the descriptive statistics of the variables used in this research. The second and the third part of this section shows the results from the regressions and discusses the findings respectively.

4.1. Descriptive statistics

The summary statistics of the dependent and independent variables is shown in Table 6. In Table 6 the number of observations, mean, standard deviation, minimum as well as maximum values are summarised. For binary variables, the table provides information about the proportion of observations with the value of 1, which can be extracted when looking at the mean of the binary variable.

The dataset used in this research includes 941 projects in total; all of these projects have reached the funding goal. In this sample, for the binary variable *Success,* the proportion of observations with a value of 1 are 92% (the mean is 0.92), which means that 92% of crowdfunding projects successfully delivered products to its initial backers, whereas 8% of them have failed in doing so. Only 35 projects from a total of 75 projects who failed to deliver the product have officially offered refunds to their backers. In projects that have successfully delivered the products to the backers (*Success=1)*, the mean value for *Late delivery* shows that successful projects delivered their products on average 54.88 days later to the backers than initially promised. For this variable, a positive number indicates how many days the product delivery was delayed but a negative number shows by how many days the delivery happened earlier than planned. For example, the minimum value of -807 means that backers received the desired product or service 807 days earlier than promised.

The average *Price* for products in this sample is 186.38 USD and the average number of days planned for *Production* that are set by the entrepreneur are 64.39 days. *Comments per backer* until campaign closure is on average 0.20, and the number of articles (*Max articles)* that are published about the product or service until the campaign closure is on average 4.65.

As shown in table 6, entrepreneurs running the crowdfunding project have been in business on average 3.05 years before launching the campaign. However, these entrepreneurs have previously created and succeeded in financing 2.02 other crowdfunding campaigns, on average. 42% of the projects included a detailed *Schedule* for their future plans in the description section of the main campaign page, while the

number of *Updates* published by entrepreneurs is on average 19.44. The average number of employees of the company that is launching the product is 8.70.

When looking at funding related factors, projects had 0.14 additional funding rounds (*Funding rounds)* on average, with a mean of 4.53 for additional money raised in monetary terms (*Additional funding ratio).* However, the mean of *Funding goal* and *Overfunding* is 9.10 and 0.96 respectively, and the *Dow Jones Index* during the time frame of 5 years is 18454.37 on average.

Table 6. Summary of dependent and independent variables.

Variable	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*
Dependent Variables					
Success (1=successful, 0=failed)	941	0.92	0.26	0	1
Late delivery (days)	892	54.88	120.76	-807	864
Product Related Variables					
Price (USD)	913	186.38	479.31	1	6000
Production (days)	913	64.39	70.29	-81	844
Comments per backer	941	.20	.36	0	5.34
Max articles (# of articles)	941	4.65	11.11	0	190
Expertise, Skills and Commitment Related Variables					
Experience (years)	796	3.05	5.80	0	79
Successful past campaigns (# of campaigns)	941	2.02	3.22	0	19
Schedule (1=if present, 0=not included)	941	.42	.49	0	1
Updates (# of updates)	941	19.44	13.04	2	136
Team (# of employees)	699	8.70	33.23	1	750
Funding Related Variables					
Add_funding_ratio	941	4.53	38.71	0	773.33
Fund_rounds (# of funding rounds)	941	.14	0.56	0	5
ln_Fundinggoal (ln of USD)	941	9.10	1.56	0	12.76
ln_Overfunding (ln of %)	941	0.96	0.97	0	9.17
Control Variables					
Dow Jones Index (Closing value)	941	18454.37	3003.96	13104.14	26743.50

Source: Created by the author using STATA software.

As shown in Table 6, there is missing data for some of the variables; the number of observations is not the same for all variables. In order to avoid losing data due to missing data, the mean-substitution method, which allows to replacing missing values with the mean of a particular variable, is applied for variables, such as *Late delivery, Price, Production, Experience* and *Team* (Raymond & Roberts, 1987).

Afterwards, to detect outliers on this dataset, histograms as well as box plots for all non-binary variables are created. Vertical box plots are drawn in which the median

for a particular variable is represented by the line in the box. Also, an interquartile box is displayed; the box includes the observations in the middle 50% of the data, see Appendix A. Values that are outside the box, above and under the displayed lines can be considered as outliers. When outliers are detected, instead of removing observations with extreme values, the winsorization technique is applied.

As seen in the box plots, variables such as *Late Delivery, Price, Production, Comments per backer, Articles published, Experience* and *Updates* have around 7-10 extreme values that can be considered as outliers. In order to not bias the regression results, all variables with outliers are winsorized at a 99% level using the one-sided winsorization technique. However, additional two-sided winsorization at level 1% and 99% is applied to variables *Late delivery* and *Production,* as these variables have positive as well as negative values and outliers are found in both tails.

Table 7. Summary of dependent and independent variables after mean-substitution and winsorization.

Variable	***Obs***	***Mean***	***Std. Dev.***	***Min***	***Max***
Dependent Variables					
Success (1=successful, 0=failed)	941	0.92	0.26	0	1
Late delivery (days)*	941	80.57	152.20	-177	544
Product Related Variables					
Price (USD)*	941	177.75	400.52	1	2899
Production (days)*	941	63.33	62.96	-21	289
*Comments per backer**	941	.19	0.26	0	1.69
Max articles (# of articles)*	941	4.26	7.89	0	34
Expertise, Skills and Commitment Related Variables					
Experience (years)*	941	2.91	4.20	0	26
Successful past campaigns (# of campaigns)	941	2.02	3.22	0	19
Schedule (1=if present, 0=not included)	941	.42	.49	0	1
Updates (# of updates)	941	19.44	13.04	2	136
Team (# of employees)*	941	7.42	9.72	1	75
Funding Related Variables					
Add_funding_ratio	941	4.53	28.71	0	773.33
Fund_rounds (# of funding rounds)	941	.14	0.56	0	5
ln_Fundinggoal (ln of USD)	941	9.10	1.56	0	12.76
ln_Overfunding (ln of %)	941	0.96	0.97	0	9.17
Control Variables					
Dow Jones Index (Closing value)	941	18454.37	3003.96	13104.14	26743.50

**Observations with outliers were detected and winsorized for this variable.*

Source: Created by the author using STATA software.

After the mean-substitution method is applied, there is no more missing data for any of the variables used in this research and the mean for most of the variables with outliers has decreased after winsorization, see Table 7.

4.2. Analysis of results

The first part of this subsection discusses the findings of IV Probit regression with the dependent variable *Success.* In this model, the main emphasis is put on the probability of successful delivery. The second part of this subsection discusses the findings of IV regression with the dependent variable *Late delivery,* where the influence of independent variables on delayed delivery is investigated.

Before proceeding with regression analysis, the VIF test is performed for both regressions to counter for multicollinearity. The VIF values of both models are less than 5; the highest value is 2.32 for *Funding goal,* thus, there should not be a multicollinearity problem, see Appendix B (Rogerson, 2001).

First, in order to check the validity of endogenous variables, IV regression with two-stage least square (TSLS) estimators is employed. The endogenous variable in this model is *Overfunding* with two instrumental variables – *Articles Published* and *Comments per backer,* which are chosen as they do not affect the success of crowdfunding campaigns directly and they are outside the scope of the entrepreneur.

In order to estimate *Overfunding* using TSLS, both relevance and exogeneity conditions should be tested and satisfied for instrumental variables. The relevance condition is satisfied when the instrumental variables (*Articles Published* and *Comments per backer)* correlate with the endogenous variable (*Overfunding)*. The exogeneity condition is satisfied when the instrumental variables in the model do not have a direct impact on the dependent variable (*Success)* (Hall, Rudebusch, & Wilcox, 1996).

For the first condition, as shown by Table 8, *Articles published* and *Comments per backer* have a significant effect on *Overfunding*; these instruments are relevant. The coefficients of *Articles Published* and *Comments per backer* both are significant at 1%, which means that they both have a significant effect on *Overfunding* and they do not correlate with the dependent variable (*Success)*.

In order to test the exogeneity of instrumental variables, F-statistics are calculated. In particular, overidentifying restriction test is employed, where the null hypothesis is that all instruments are exogenous, that is, they do not correlate with *u* residual. The test results show that at 1% significance level hypothesis cannot be

rejected (chi2 = 5.06689 (p = 0.0244), which allows one to assume that the instruments are exogenous, thus, both instruments can be considered as valid instruments – they have satisfied both criteria relevance and exogeneity.

Even though higher a level of exogeneity might be expected for the chosen instrumental variables, it can be explained by possible insider information or additional due diligence done by publishers or backers. Meaning that a potential reverse effect from higher success in terms of funding (*Overfunding*) on *Articles published* and *Comments per backer* might be captured if publishers and backers already had additional information on the future performance of the project and they somehow knew that particular project will notably succeed or not.

Table 8. TSLS regression, output of the first stage

ln_Overfunding	***Coef.***	***Std. Err.***	***t-value***	***p-value***
price	0.0002	0.0001	2.37	0.018**
production	0.0003	0.0005	0.64	0.525
experience	0.0047	0.0083	0.57	0.571
successful_campaigns	0.0004	0.0082	0.05	0.959
schedule	0.1949	0.0618	3.15	0.002***
updates	0.0185	0.0030	6.21	0.000***
team	0.0084	0.0036	2.35	0.019**
ln_fundinggoal	-0.4139	0.0497	-8.32	0.000***
add_funding_ratio	0.0000	0.0007	0.00	0.998
fund_rounds	0.1427	0.0620	2.30	0.022**
dowjones	0.0000	0.0000	-0.89	0.372
max_articles	0.0181	0.0040	4.52	0.000***
commentsperbacker	0.3084	0.1266	2.44	0.015**
_cons	4.1486	0.4727	8.78	0.000

Number of obs	941	R-squared	0.3045
F (13, 927)	12.89	Adj R-squared	0.2948
Prob > F	0.0000	Root MSE	0.8136
Significance	*** *p<0.01*	** *p<0.05*	* *p<0.1*

Source: Created by the author using STATA software.

The next step is to run the IV Probit regression with TSLS estimators included in the model. As the previous model already provided information about instrumental variables, for this regression only results of the second stage are considered which allows one to analyse the relevance of each variable that may explain successful delivery, see Table 9. R-squared for this regression is 0.3045, which means that 30.45% of *Success* rate variance is explained by the independent variables used in this model. The results of IV Probit regression show that there are three variables that have a

significant effect on the successful delivery of the product – *Successful past campaigns, Overfunding* and *Funding goal*.

For a more in-depth analysis, the marginal effects were captured using the means, see Appendix C. This regression is performed to estimate marginal effects for each variable, as IV Probit model only predicts significance level and signs for the respective variables (positive or negative). However, if we compare both regression outputs, coefficients are the same in both models, thus, in this case, coefficient values in IV Probit model seems to be true also for marginal effects.

Table 9. IV Probit regression with TSLS estimators, output of the second stage

Success	***Coef.***	***Std. Err.***	***t-value***	***p-value***
ln_overfunding	-1.6156	0.4609	-3.51	0.000***
price	0.0004	0.0002	1.55	0.120
production	0.0006	0.0013	0.48	0.634
experience	0.0016	0.0185	0.09	0.930
successful_campaigns	0.0721	0.0414	1.74	0.082*
schedule	-0.0357	0.2070	-0.17	0.863
updates	0.0126	0.0109	1.15	0.249
team	0.0074	0.0090	0.83	0.407
ln_fundinggoal	-0.6643	0.1929	-3.44	0.001***
add_funding_ratio	0.0015	0.0029	0.51	0.611
fund_rounds	0.2580	0.1741	1.48	0.138
dowjones	0.0000	0.0000	-1.10	0.271
_cons	9.2164	1.9841	4.65	0.000***
Number of obs	941	F(13, 927)		31.22
Wald chi2(12)	48.80	R-squared		0.3045
Prob > chi2	0.0000	Adj. R-squared		0.2948
Wald test of exogeneity:	chi2(1) = 14.35	Prob > chi2 = 0.0002		
Significance	*** *p<0.01*	** *p<0.05*	* *p<0.1*	

Source: Created by the author using STATA software.

In the second step of Probit regression with endogenous variable, the *Successful past campaigns* variable is significant at 10% with a positive coefficient, which means that if an entrepreneur had an additional successful previous campaign, it increases the probability of successful delivery by 0.0721 percentage points (pp). The variable *Overfunding* is significant at 1% and the coefficient is negative; the project will have a lower probability of successful delivery by 1.6156pp, if overfunding achieved during campaign increases by 1 percent. The third variable that has a significant effect on the successful delivery of the product is *Funding goal.* It is significant at 1% with a

negative coefficient, meaning that if the set threshold (*Funding goal)* increases by 1%, it decreases the probability of overall success of the project by 0.6643pp.

In the following I aim to investigate which variables have a significant impact on delayed deliveries for successful crowdfunding projects (*Success*=1), thus, IV regression with TSLS estimators and with the dependent variable *Late delivery* is employed. The output of the first stage estimates the endogenous variable *Overfunding* with two instrumental variables – *Articles Published* and *Comments per backer,* see Appendix D. This test is the same as the one employed in the first part of this section for IV Probit model, moreover, the same conclusions made previously about instruments can be made regarding this regression, see Table 8 and Appendix D for comparison.

The results of the second stage of IV regression with TSLS estimators included in the model shows that there are four independent variables which significantly affect *Late delivery* of the product for the successful campaigns – *Time for the project realization, Successful past campaigns, Schedule* and *Funding goal,* see Table 10.

Table 10. IV regression with TSLS estimators, output of the second stage

Late delivery	***Coef.***	***Std. Err.***	***t-value***	***p-value***
ln_overfunding	42.8755	35.0165	1.22	0.221
price	-0.0245	0.0163	-1.50	0.133
production	-0.2525	0.0999	-2.53	0.011**
experience	0.3731	1.3626	0.27	0.784
successful_campaigns	-2.4203	1.0871	-2.23	0.026**
schedule	-28.5798	10.6867	-2.67	0.007***
updates	0.4622	0.7960	0.58	0.561
team	-0.7058	0.5848	-1.21	0.228
ln_fundinggoal	28.7866	14.2983	2.01	0.044*
add_funding_ratio	-0.0623	0.1134	-0.55	0.583
fund rounds	13.1326	14.6036	0.90	0.369
dowjones	-0.0013	0.0015	-0.86	0.390
cons	-181.8532	147.1825	-1.24	0.217
Number of obs	870	R-squared		.
Wald chi2 (12)	35.57	Root MSE		133.16
Prob > chi2	0.0004			
Significance	*** p<0.01	** p<0.05	* p<0.1	

Source: Created by the author using STATA software.

As shown in Table 10, the variable *Time for the project realisation* is significant at 5% and with a negative coefficient, which means that an additional day planned for the production of the product decreases delayed delivery by 0.2525 days. The variable *Successful past campaigns* is also significant at 5% and it has a negative effect on *Late*

delivery. If the number of successful previous campaigns increases by one, then the number of delayed days for delivery decreases by 2.4203 days. *Schedule* which is a binary variable is significant at 1% and with a negative coefficient, meaning that the presence of a published schedule during the campaign decreases delayed delivery by almost a month (28.5798 days). The fourth variable that has a significant impact on *Late delivery* is *Funding goal.* It is significant at 5% and an increase in *Funding goal* by 1% increases the number of days of *Late delivery* by 28.7866 days.

4.3. Robustness checks

In order to examine how stable current regression coefficients are, some of the assumptions or methods used in the models are modified. In total, four robustness checks are applied. If the coefficients from tests are found to be robust, it can be considered that there is strong evidence of structural validity (Lu & White, 2014).

In the first robustness check winsorization at the 95% level is employed, instead of 99% level, to account for outliers, while keeping other things constant. In this test, it was found that most of the results hold after changes to modelling assumptions are employed. Some of the variables might have become less significant but no major changes were detected, see Appendix E.

The second robustness check employed is also related to outliers; here the impact of dropping outliers at 99% level instead of winsorizing them is tested. When comparing new results to current outcomes, it can be seen that a small shift in significance is found when testing for instrumental variables and employing the IV Probit regression. Also, some coefficients in IV regression have become insignificant (e.g. *Schedule, Successful past campaigns* and *Funding goal),* however, no radical changes in signs of effects are observed, see online Appendix F.

The third robustness check is introduced in order to account for missing values; trimming instead of the mean-substitution method for missing data is used. Similarly, only small shifts in significance levels for the main variables were found in all models. At the same time, the variable *Dow Jones Index* in IV probit regression shows a notable impact on *Success* in this specification*,* which confirms that the favourable state of the economy has a positive effect on product development, see online Appendix G.

The fourth robustness check tests the model on a sample that includes only projects with their *Funding goal* set less than $30,000. This test also shows no significant variations from the already chosen method for this research. In the IV

regression two variables, *Additional funding* and *Funding rounds* were found to be significant as well, see online Appendix H.

After the robustness checks, it can be seen that the overall results are not influenced by changes in dataset and methods used to account for outliers, missing values or the sample size. This lets us conclude that the chosen statistical model produces valid results and there is strong evidence of structural validity.

4.4. Discussion of results

When attempting to answer the research question – "*What are the determinants of successful technology product delivery after the crowdfunding campaign's funding goal is reached?*", it was found that there are three factors that significantly affect successful delivery in crowdfunding campaigns and four factors that have a strong effect on delayed deliveries of the product. These variables will be discussed in the following paragraphs.

The findings of this research show that funding related factors play a crucial role in the successful technology product delivery. Not surprisingly, the results reveal that funding related factors, such as *Overfunding* and *Funding goal* have the strongest effect. Both of these factors have a negative impact on successful delivery, which means that an increase in their values decreases the probability of overall success of the project. The effect from *Funding goal* might be explained by increasing complexity as well as the capital needed in order to launch the product; the higher the *Funding goal,* presumably the greater the complexity and the resources needed. This finding is in line with the research done by Lynn et al. (1999) and Alvarez and Barney (2001), who claim that the development of complex products has a strong negative impact on the product launch and further stability of the company.

The negative effect of *Overfunding* might be explained by the unexpected success during the funding round; the entrepreneurs face difficulties in satisfying the increased demand. This finding is in line with the argument of Mollick (2014) who claims that even well-funded projects might have problems to deliver products to the backers due to increased expectations and unexpected scope relative to the initial plan. Additionally, interdependencies in the chain of product development are very strong, the process starts with the engineer who develops the product and finishes with manufacturing it. Problems with the product delivery might occur when the scale and

scope of the project increases unexpectedly - overfunding is a clear sign of backers' desire to increase scale. (Brown & Eisenhardt, 1995).

The positive effect on *Success* was also found from one of the expertise, skills and commitment related variables, *Successful past campaigns.* This variable indicates professional competence and previous experience of the entrepreneurial team with fundraising and innovative product development, as it shows in a number of successful past campaigns in terms of funding goal reached. As argued by Van Gelderen et al. (2005), the entrepreneurial experience of the founding team should help the startup to succeed and prevent unexpected errors in the management. However, this variable could also indicate that the creator of the campaign (e.g. entrepreneur) might have additional funds available from previous campaigns, which again might give an extra boost for the project.

Surprisingly, none of the product related factors, such as *Price, Time for the project realisation, Articles published* and *Comments per backer* showed an impact on successful delivery. This finding signals that as long as the entrepreneurial team has a great idea, the appropriate skills within the team to execute production in an efficient way and all necessary funding requirements for the project are satisfied, none of the complexity constraints should matter.

Essentially, not many projects failed delivering products to their backers, only 8%, that is, 71 projects out of 941 in total. Half of the failed projects offered refunds to their backers, however, the other half had numerous refund requests in the campaign's comments section, but the entrepreneur never announced an official refund and just stopped answering to backers. This low fail rate could give more incentives for investors to invest in technology projects without fear that they will lose money. In case of successful funding, the chance for receiving the desired product is high; for technology products, it is 92% on Kickstarter. Although in the remaining 8% of the campaign's products that are not delivered to the backers, the investment is only fully lost in half of the cases. In the other half of the cases, the backers receive a refund.

The findings of the second part of the analysis show that the most important factors that affect successful product delivery, however, this time in a timely manner, are funding related as well as expertise, skills and commitment related factors. Variable *Successful past campaigns* has a negative effect on *Late delivery;* more previous experience with new product development decreases the number of days of delayed delivery. This finding is in line with the findings Van Gelderen et al. (2005), who found the same for startups when looking at factors that affect the success of the startup.

Another expertise, skills and commitment related variable that appeared to impact *Late delivery* is *Schedule;* the presence of a published schedule or timeline of a business plan during the campaign decreases delayed delivery by almost a month. This effect can be considered as quite strong. This finding is in line with the research on the success of startups done by Miner and Raju (2004), who claim that a predetermined schedule and business plan indicates skills and dedication of the entrepreneurial team, thus, also generating a higher possibility to lead the project to realisation.

The variable *Time for the project realisation* has a significant negative effect on *Late delivery;* an additional day planned for the production of the product decreases the number of days for late delivery. This variable shows how good the entrepreneur is at production planning and estimations; the more days that are planned for production, the higher the probability to deliver the product to its backer on promised time. However, it might not be true in all cases, as this finding implies that for the entrepreneur it is better to show more days for production than are actually needed. For example, assuming that the entrepreneurial team is usually overoptimistic and it tends to accept more inquiries than it can actually fulfill, as suggested by Cooper (1999), when larger and more complex projects need to adjust to sudden changes in their business plan, the chance of having a stronger effect on the increase in number of days for late delivery is more likely than it would be for smaller projects.

The last factor that may signal *Late delivery* is *Funding goal*; it shows that a 1% increase in this variable increases the number of days of *Late delivery* by 29 days - almost a month. As discussed previously, higher a *Funding goal* signals greater complexity of the product (Lynn et al., 1999; Hauge & Chimahusky, 2016), which supports the finding that larger projects suffer much longer delays than smaller and less complicated projects.

However, one concern that could arise here is that entrepreneurial teams tend to either underestimate their funding needs in case of a complicated product development process, thus, not setting a sufficient *Funding goal* for the campaign, or they accept too much capital in case of *Overfunding* even though their capabilities do not allow them to execute it at their current state. Both of those scenarios indicate they do not have well-developed business plans and poor strategic planning; both lead to delayed deliveries and unsatisfied backers. No doubt, there are various risks involved in successful project realisation at an early stage and, thus with the further delivery of the product. Investors, therefore, have a good reason to assess the signalling factors and the level of risk carefully before backing a particular project.

On average, late deliveries happen by 80 days, however, there are quite a few projects which showed even longer delays, and the product was delivered only 1-2.5 years later than initially promised. Usually, in the case of new entrepreneurs and startups, founders themselves often struggle to meet the deadlines that they have set, moreover, these missed deadlines can be even greater if the founders have not had an entrepreneurial experience before and unexpected obstacles have surfaced.

In the literature review, prior expectations about the possible effects on the dependent variables were introduced. Expectations for the impact from some but not all product related factors (i.e. *Time for the project realisation*) and expertise, skills and commitment related factors (i.e. *Successful past campaigns*) were confirmed by the empirical research. However, for funding related factors it was hard to develop prior expectations as the effects might be different depending on the unique situation for each project; in this research negative effects which come from complicated product development were found to be present.

4.5. Limitations and suggestions for further research

While the results are compelling, this research shall be considered as the first attempt to investigate the phenomena of successful product delivery for crowdfunding projects, thus, it has several limitations that need to be discussed.

Firstly, this paper analyses only reward-based crowdfunding campaigns for technology products. It is likely that projects in other categories may have different driving forces as the products themselves are very different from technology products. Moreover, other types of crowdfunding, such, as donation-based and equity-based crowdfunding might define real success in a different way.

Secondly, besides using factors that were introduced for the first time in this research, there are also many other factors that cannot be quantified, as a result, their impact cannot be captured. For product related variables these factors include unexpected events, such as difficulties with manufacturing, pricing/cost issue, changes in scope, changes in scale, lack of technological or business capabilities of the team, lack of focus or even some legal issues (Mollick, 2014). However, as these unexpected events do not indicate initial strategies by the founding team, it is hard to tell whether they would evidence any impact. Among expertise, skills and commitment related variables there are several factors which are harder to measure: competence of each team member, lack of focus, harmony among the team and not the right team for the

particular project. Additionally, there might be some funding related variables which are not publicly announced but include funds available for the entrepreneur; these variables were not captured in this research.

Thirdly, as this is the first paper which developed a definition for failed projects in terms of failed delivery, the validity of this definition requires further support. Additional criteria through a more in-depth approach as well as qualitative justification would help to identify these projects fully. Also, additional qualitative research might give better insights into why these particular projects failed in delivering the product to its initial backers.

Fourthly, the Cox proportional hazards model instead of the IV probit and the IV regressions model might be used as the Cox proportional hazards model is able to show not only whether particular variables increase or decrease the probability of delayed product deliveries but it also allows the inclusion of projects which have not delivered the product yet but are in the process of developing it as of now.

Due to the fact that this research focuses on the entrepreneurial teams' part of the project realisation using only factors that can be collected using publicly available resources, it is suggested that research for the future could include factors that cannot be quantified and would use tools to get a better insight into the actual process of the project development from the inside of the entrepreneurial team.

5. Conclusions

The goal of this research was to identify factors determining successful technology product delivery after the crowdfunding campaign's goal is reached. No previous work in the literature has investigated these factors. This research looks at US-based technology projects launched on the platform Kickstarter. In this paper, a model with 2 dependent, 13 independent and 1 control variable was developed, which covers factors that may affect the successful project realisation, hence, delivery of the product. The chosen factors take into account product related, funding related and expertise, skills and commitment related factors that can be quantified, as well as it controls for the general state of the economy.

In this study, failed crowdfunding projects were defined and factors affecting the successful delivery were analysed in a systematic way, for the first time in the literature. In total, 3 factors out of 13 showed a significant effect on successful delivery – *Fundraising goal, Overfunding achieved* and the number of *Successful past campaigns.*

Moreover, 4 factors out of 13 were found to have a strong influence on late deliveries for successfully funded campaigns – *Schedule, Time for the project realisation, Successful past campaigns* and *Fundraising goal.* Overall, funding related variables were concluded to have the strongest impact on the successful delivery in a timely manner for technology products.

In general, the outcome of analysis shows a positive experience for backers as well as for entrepreneurs using crowdfunding as their funding option. Only a small proportion of those projects failed to introduce their product to the market, hence, deliver it to the initial backers of the campaign. Also, considering that the crowdfunding market is growing substantially every year, it is obvious that it will continue playing an important role in the entrepreneur community as well as in economic growth. Therefore, both entrepreneurs and investors should be interested in assessing the opportunities as well as important aspects for the process of project realisation. Since there is no research done in this area and this is the first paper to analyse such factors that may influence project realisation after the successful crowdfunding campaign, this paper provides valuable insights into this research field and may open new possibilities for further research.

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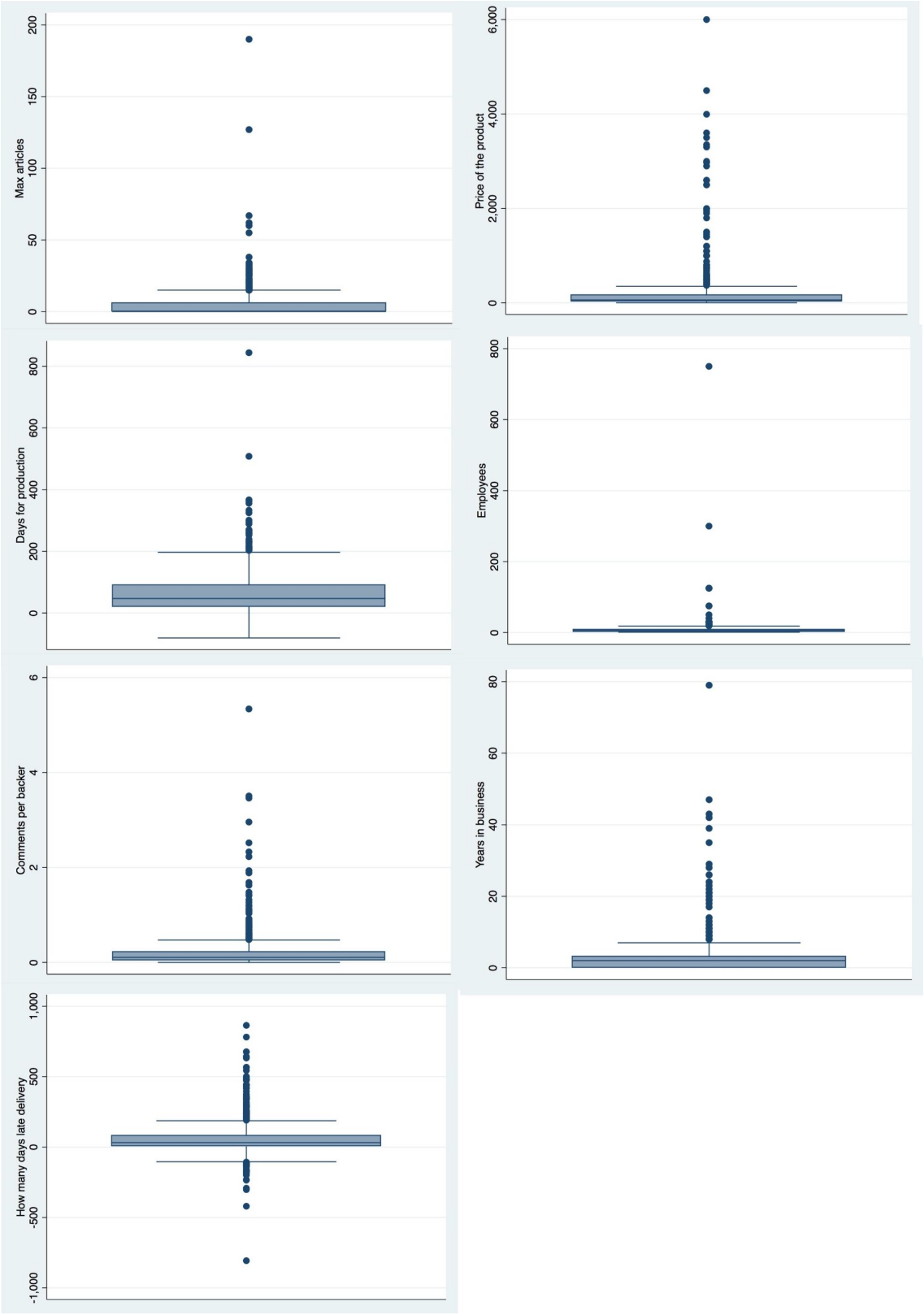
7. Appendices

Appendix A. *Box Plots for non-binary variables with outliers*



Source: Created by the author using STATA software.

Appendix B. *VIF values for both regressions*

Variable	***VIF***	***1/VIF***
ln_fundinggoal	2.32	0.4307
fund_rounds	1.68	0.5963
add_funding_ratio	1.44	0.6960
ln_overfunding	1.42	0.7037
max_articles	1.36	0.7352
production	1.33	0.7510
updates	1.26	0.7928
schedule	1.19	0.8368
price	1.18	0.8440
team	1.17	0.8526
successful_campaigns	1.16	0.8628
experience	1.15	0.8698
commentsperbacker	1.10	0.9115
dowjones	1.05	0.9532
Mean VIF	1.34	

Source: Created by the author using STATA software.

Appendix C. *Marginal effects for IV Probit model*

Latedelivery	***Coef.***	***Std. Err.***	***t-value***	***p-value***
ln_overfunding	-1.6156	0.4609	-3.51	0.000***
price	0.0004	0.0002	1.55	0.120
production	0.0006	0.0013	0.48	0.634
experience	0.0016	0.0185	0.09	0.930
successful_campaigns	0.0721	0.0414	1.74	0.082*
schedule	-0.0357	0.2070	-0.17	0.863
updates	0.0126	0.0109	1.15	0.249
team	0.0074	0.0090	0.83	0.407
ln_fundinggoal	-0.6643	0.1929	-3.44	0.001***
add_funding_ratio	0.0015	0.0029	0.51	0.611
fund_rounds	0.2580	0.1741	1.48	0.138
dowjones	0.0000	0.0000	-1.10	0.271

Number of obs	870		
ln_overfunding	0.96 (mean)	successful_campaigns	2.02 (mean)
ln_fundinggoal	9.09 (mean)	schedule	0.42 (mean)
experience	2.91 (mean)	team	7.42 (mean)
production	63.33 (mean)	add_funding_ratio	4.53 (mean)
updates	19.44 (mean)	fund_rounds	0.14 (mean)
price	177.74 (mean)	dowjones	18454.37 (mean)
Significance	*** *p<0.01*	** *p<0.05*	* *p<0.1*

Source: Created by the author using STATA software.

Appendix D. *IV regression with TSLS estimators, output of the first stage*

ln_Overfunding	***Coef.***	***Std. Err.***	***t-value***	***p-value***
price	0.0002	0.0001	1.97	0.049**
production	0.0009	0.0005	1.74	0.082*
experience	0.0071	0.0093	0.76	0.445
successful_campaigns	0.0029	0.0082	0.36	0.723
schedule	0.1439	0.0592	2.43	0.015**
updates	0.0158	0.0030	5.20	0.000***
team	0.0081	0.0037	2.17	0.030**
ln_fundinggoal	-0.4052	0.0519	-7.81	0.000***
add_funding_ratio	-0.0003	0.0008	-0.37	0.711
fund_rounds	0.1757	0.0718	2.45	0.015**
dowjones	0.0000	0.0000	-1.37	0.170
commentsperbacker	0.3285	0.1435	2.29	0.022**
max_articles	0.0180	0.0041	4.36	0.000***
_cons	4.1563	0.5087	8.17	0.000***
Number of obs	870	R-squared		0.2963
F (13, 856)	11.60	Adj R-squared		0.2856
Prob > F	0.0000	Root MSE		0.7931
Significance	*** p<0.01	** p<0.05	* p<0.1	

Source: Created by the author using STATA software.

Appendix E. *Robustness check with 95% winsorization*

Table E.1. *TSLS regression, output of the first stage*

ln_Overfunding	***Coef.***	***Std. Err.***	***t-value***	***p-value***
price	0.00	0.0002	2.84	0.005***
production	0.00	0.0006	0.75	0.454
experience	0.00	0.0119	-0.14	0.892
successful_campaigns	0.00	0.0081	0.08	0.939
schedule	0.18	0.0617	2.88	0.004***
updates	0.02	0.0030	6.18	0.000***
team	0.01	0.0045	3.28	0.001***
ln_fundinggoal	-0.43	0.0515	-8.34	0.000***
add_funding_ratio	0.00	0.0007	-0.19	0.846
fund_rounds	0.13	0.0611	2.19	0.029**
dowjones	0.00	0.0000	-0.89	0.372
max_articles	0.02	0.0048	4.55	0.000***
commentsperbacker	0.45	0.1829	2.48	0.013**
_cons	4.20	0.4769	8.81	0.000***
Number of obs	941	R-squared		0.3100
F (13, 927)	13.33	Adj R-squared		0.3003
Prob > F	0.0000	Root MSE		0.8107
Significance	*** p<0.01	** p<0.05	* p<0.1	
Score chi2(1) = 6.27625 (p = 0.0122)				

Source: Created by the author using STATA software.

Table E.2. *IV Probit regression with TSLS estimators, output of the second stage*

Success	***Coef.***	***Std. Err.***	***t-value***	***p-value***
ln_overfunding	-1.57	0.4509	-3.48	0.001***
price	0.00	0.0006	0.95	0.344
production	0.00	0.0015	0.54	0.588
experience	0.00	0.0310	0.03	0.974
successful_campaigns	0.07	0.0415	1.68	0.092*
schedule	-0.05	0.2009	-0.26	0.791
updates	0.01	0.0106	1.04	0.299
team	0.01	0.0142	0.64	0.520
ln_fundinggoal	-0.64	0.1949	-3.29	0.001***
add_funding_ratio	0.00	0.0031	0.60	0.550
fund_rounds	0.25	0.1704	1.45	0.148
dowjones	0.00	0.0000	-1.17	0.242
_cons	9.01	1.9629	4.59	0.000***

Number of obs	941	F(13, 927)	32.03
Wald chi2(12)	50.53	R-squared	0.3100
Prob > chi2	0.0000	Adj. R-squared	0.3003
Wald test of exogeneity:	chi2(1) = 12.81	Prob > chi2 = 0.0003	
Significance	*** *p<0.01*	** *p<0.05*	* *p<0.1*

Source: Created by the author using STATA software.

Table E.3. *IV regression with TSLS estimators, output of the second stage*

Latedelivery	***Coef.***	***Std. Err.***	***t-value***	***p-value***
ln_overfunding	20.92	22.8395	0.92	0.360
price	-0.01	0.0324	-0.21	0.835
production	-0.30	0.0755	-4.02	0.000***
experience	-0.29	1.1532	-0.25	0.804
successful_campaigns	-1.49	0.8387	-1.77	0.076*
schedule	-11.59	7.5178	-1.54	0.123
updates	0.35	0.5547	0.64	0.523
team	-0.41	0.6306	-0.64	0.520
ln_fundinggoal	16.62	9.7224	1.71	0.087*
add_funding_ratio	-0.06	0.0750	-0.80	0.421
fund_rounds	14.08	9.7517	1.44	0.149
dowjones	0.00	0.0009	-1.19	0.236
_cons	-76.89	95.9437	-0.80	0.423

Number of obs	870	R-squared	0.0268
Wald chi2 (12)	45.32	Root MSE	87.412
Prob > chi2	0.0000		
Significance	*** *p<0.01*	** *p<0.05*	* *p<0.1*

Source: Created by the author using STATA software.