Analyzing the influence of crowdfunding founder's social network on crowdfunding success

Thesis BSc International Business Administration

Author: Yuou Wang (s2000075)
University of Twente
P.O. Box 217, 7500AE Enschede
The Netherlands

ABSTRACT,
In this paper, a quantitative research will be conducted to focus on finding how crowdfunding founder's social network will influence the crowdfunding success. Fifty technology crowdfunding projects are selected from Kickstarter.com as the observed targets. For these observed projects, the social capital theory and social network theory will be used to help answer the research question. The result of this research will illustrate the relationship between the founder's social network and crowdfunding success.

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Keywords
Crowdfunding Success**,** Founder's Social Network, Social Capital Theory, Social Network Theory, Social Network Analysis, Number of Facebook Friends, Number of Collaborators, Number of Backers

1. INTRODUCTION

Crowdfunding is an upcoming financial alternative for entrepreneurs and startups to raise a relatively small amount of money from many people, it is commonly conducted through the internet (Calic, 2018). There is growing popularity in online crowdfunding over the years, there were over 2,000 available crowdfunding platforms in the year 2018, with a total market value of 10 billion dollars (Spajic, 2019). With the development of these crowdfunding platforms, more and more crowdfunding projects are being completed by attracting a promising amount of funds from a diverse group of investors (Bradley & Luong, 2013). Most crowdfunding projects on online platforms such as Kickstarter.com are reward-based. Reward-based crowdfunding projects normally pay back investors with products or services instead of incurring debt or giving away shares. It has been widely used for various purposes, including civic projects, inventions development, scientific research, etc. (McGowan, 2018; Hollow,2013). Unlike other traditional financial tools, crowdfunding also enables distant investors to easily participate in a large variety of entrepreneurial projects over the globe. A study shows the average distance between an entrepreneur and his/her crowdfunding investors is around 5,000 kilometers (Belleflamme et al, 2013).

There are three major actors involved in the online reward-based crowdfunding process: the project founder who has a new idea that needs to be funded, individuals who want to support the idea through investing, and the crowdfunding platforms that connect the previous two actors (Ordanini et al., 2011).

For project founders, crowdfunding has been used as a convenient tool to raise funds for a wide range of entrepreneurial ventures such as creative arts, technology designs, entertaining projects. Compared to other financial alternatives, crowdfunding provides a larger investor pool with relatively low capital costs (Gleasure & Feller, 2016). Beyond the financial benefits, crowdfunding also brings other non-financial gains such as marketing, audience engagement, and product/service feedback to the project founders (Agrawal et al, 2013). For individual investors, crowdfunding platforms give them access to be a part of a project/company in the early development stages. Moreover, it generally has a lower searching and transaction cost than investing through traditional ways such as finding a capital venture firm. Crowdfunding platforms help individual investors to easier identify and participate in potential investment opportunities. (Caldbeck, 2012). For the last actor, crowdfunding platforms usually generate profits by taking a percentage of money that each project raised, this processing fee is usually a combination of a fixed percentage plus a flexible

The interests of all three sides can be fulfilled when a crowdfunding project is successfully completed. When a project is successful, the project founder draws necessary funding to support activities such as R&D for their products/services. It also increases the likelihood of individual investors who have invested in crowdfunding projects to receive the promised paybacks once those products/services have been successfully carried out. In the meantime, the intermediate platforms gain profits from each completed project. However, the success rate of crowdfunding projects remains problematic. According to a study conducted by Mollick (2014) about the crowdfunding samples on Kickstarter.com, the average success rate of these projects is only 48.1% between 2007 and 2011. This number was even falling to less than 40% in the year of 2015, 2016, and 2017 (Bidaux, 2018).

To acquire the benefits of crowdfunding as a financial alternative, the crowdfunding success rate has to be improved. Thus, it is crucial to find the influential factors of crowdfunding success. These related factors are usually directly linked to the nature of crowdfunding projects or the founder of the projects (Koch & Siering, 2015). They generally decide how promising the crowdfunding project is, to attract funding from potential individual investors.

Several academic studies have been conducted on finding the related factors on crowdfunding success in recent years. Among them, a considerable amount of papers has focused on finding the influence of social factors on crowdfunding success. (Colombo et al, 2015; Zheng et al, 2014; Kromidha & Robson, 2016). By extending the results of prior studies, the social capital theory and social network theory will be used in this paper. To solely focus on finding the relationship between crowdfunding founder's social network and crowdfunding success.

The structure of this paper will be presented as follows. First, the research question of this paper will be elaborated in **section 2**. Then, the details about supportive literature and theories will be discussed in **section 3**. **Section 4** will explain the research method and hypothesis. Furthermore, this research is quantitative-based, and the website Kickstarter.com will be used as a source for data collection, data analysis, and its result can be found in **section 5**. At the end of the paper, **section 6** will briefly summarize all previous information, the limitations of this paper will also be discussed.

2. RESEARCH QUESTION

As mentioned in **section 1**, the main purpose of this research is to help crowdfunding project founders to identify the crowdfunding's success factors by investigating the relationship between the founder's social network and crowdfunding success, Thus, the central research question of this paper is: ***How does crowdfunding founder's social network influence his/her project success?***

To answer this question, it is necessary to first define and find the related measurements of the founder's social network. Thus, the question of ***Which quantitative measurements can indicate a crowdfunding project founder's social network?*** needs to be answered first before the central research question is tackled. And this question will be answered in **section 4**.

3. LITERATRUE REVIEW

3.1 Empirical Evidence

The current research that exclusively focused on the relationship of the founder's social network and crowdfunding success is scarce. Most of the related existing literature has taken account in a bigger perspective of the founder's social capital and other related social factors. There is also a lack of supportive theories directly linking the founder's social network to the success of crowdfunding projects. To be able to progress the research and to answer the research question. This paper will be built on the existing studies about other relevant crowdfunding success factors, and to extend the relevant theories to specifically target the founder's social network.

In total, 22 academic papers about discovering the success factors of crowdfunding have been systematically reviewed. The majority of these 22 papers are selected from business journals such as journal of business research, journal of business venturing. Only 2 out of 22 of these papers are qualitative-based research, the rest of 20 are all quantitative-based research.

According to the selected literature, crowdfunding success factors can be generalized into two board categories: the project-specific factors and the founder-specific factors. Project-specific factors describe the basic characteristics of a crowdfunding

project. Common project-specific factors are project funding duration, the availability of project updates, depth of project description, assigned category, etc. The founder-specific factors are the factors that represent the general information of a crowdfunding founder, including the founder's prior experience, the number of their Facebook friends, etc. (Koch & Siering, 2015). Other external factors on crowdfunding success such as the regional effects, the community impacts of different platforms have also been discussed (Inbar & Barzlay, 2014; Fernandez-Blanco et al, 2020).

Within the 22 reviewed literature, there are 7 of them explicitly focused on the influence of social factors on crowdfunding success. Theories such as social capital theory, signaling theory, and social identity theory are commonly used theories in these papers when identifying the possible relationship between social factors and crowdfunding success. The used social factors in these papers can also be generalized into two types: the internal social factors that happen within the crowdfunding platform, such as the number of backers, number of project collaborators. And external factors that happen outside the crowdfunding platform, such as the number of founder's Facebook friends, etc. Both internal and external social factors play an essential role in crowdfunding success (Colombo et al, 2015).

In the paper by Zheng et al. (2014), authors integrate the social capital theory with cultural differences to compare how social capital influences crowdfunding performance separately in the US and China. At the end of this research, they demonstrated that the crowdfunding platforms play an essential role in connecting different social networks. Moreover, the platform itself is an independent social network community. Thus, it is important for platform providers and project founders to leverage the power of social capital to acquire crowdfunding success. However, this study was more centered around the perspective of crowdfunding platforms while comparing how the macro-social environments in two different countries influence the performance of their crowdfunding projects. Based on the prior experience of this study by Zheng et al., a more project founder's perspective focused research will be conducted in this paper, mainly using the structural dimension of social capital to explore the relationship between the founder's social networks and his/her crowdfunding success.

In another paper conducted by Kromidha & Robson (2016), social identity theory and signaling theory were used to identify the influence of the founder's social network and the exchange information between the founder and backers on crowdfunding performance. According to the social identity theory, the demonstration of the founder's identity on social networks could potentially put them in a favorable position to achieve their desired outcomes. And the signaling suggests the network environment such as frequency of updates and number of comments significantly influences crowdfunding success.

Moreover, a quantitative research has interviewed 58 Canadian crowdfunding project founders to ask their opinions on the influence of social networks on crowdfunding success (Hui et al, 2014). The result of the research shows that most founders do realize the importance of the social network on crowdfunding success. However, they have difficulties leveraging the power of social networks to help their crowdfunding projects.

By reviewing the literature, the social capital theory and social network theory have been selected to help analyze the relationship between the founder's social network and crowdfunding success. In the next two subsections, these two supportive theories will be further explained to set a basic theoretical framework for this research.

3.2 Social Capital

The social capital theory is the most frequently mentioned theory when discovering the influence of social factors on crowdfunding success in the selected literature. The social capital theory demonstrates the difference between social capital and other types of physical capital. Social capital is an intangible resource that aids the creation of human capital by inheriting the structure of connections between different actors (Coleman, 1988). In general, social capital has various definitions and conceptualizations according to different academic practices. For instance, Sander (2015) defined social capital as "the collective value of all social networks (whom people know), and the inclinations that arise from these networks to do things for each other (norms of reciprocity)." Under this definition, social capital creates benefits or value from people's social networks. In evolutionary terms, social capital can be defined as any feature of a social relationship that yields reproductive benefits (Machalek & Martin, 2015). According to these views, social capital is an important resource that can be used to increase personal access to information, influence, and enhanced power (Uzzi & Dunlap, 2005). The definitions of social capital help to explain how different social factors affect an individual's behaviors and member's behavior in an online community context such as crowdfunding platforms (Chang & Chuang, 2011).

From the different definitions of social capital, it can be concluded that the social networks of an individual play a critical role in it. However, social capital is more than just social networks, it is a multidimensional concept, and is being categorized into three different dimensions by Nahapiet and Ghoshal (1998): the structural dimension, the cognitive dimension, and the relational dimension. The structural dimension refers to an individual's social network and ties, it indicates the connection and relationship between people or units. The cognitive dimension relates to the shared means and understanding among parties, these share cognitive resources such as language, values, and cultures build the bridge for communication. At last, the relational dimension relates to the natural aspects of relationships such as trust, norms, and expectations. There is also an argument that an overlap exists between the cognitive dimension and the relational dimension since trust, norms, and reciprocity are also forms of cognitive social capital (Uphoff, 2000). Generally, the structure dimension and cognitive dimension are being regarded as the most important aspects of social capital (Krishna & Sanders, 1999; Chou, 2006; van Bastelaer, 2001). See the overview of three social capital dimensions in table 1.

Table 1. Three dimensions of social capital (Claridge, 2018)

Structural	Cognitive	Relational
Social Structure	Share understanding	Nature of relationship
Network ties and configuration	Share language, codes, values, attitudes, and beliefs	Trust and trustworthiness Identity and identification

To find out the relationship between the founder's social networks and his/her crowdfunding success, it is a prerequisite to find a way to measure the social network. As described in the previous paragraphs, social network belongs to the structural dimension of social capital, it is the structural foundation which social capital is embedded. Multiple selected literature have directly found out there is a positive correlation between social capital and crowdfunding success (Mollick, 2014; Zheng et al,

2014; Colombo et al, 2015). Thus, the measurements of social capital can be used to trace back and speculate the possible indicators for the founder's social networks.

To evaluate the scale of social capital, the nature of social capital must be first ensured. In general, there are two types of social capital: the bonding social capital and the bridging social capital. The bonding social capital refers to internal relationships a person has, it usually has characteristics of deep trust and strong ties, examples are family members or close friends. The bridging social capital refers to open, inclusive relationships, it is usually between socially heterogeneous groups (Pelling & High, 2005; Edwards, 2004). In crowdfunding processes, the project founders are usually dealing with bridging social capital, it is a type of social relationship with a large variety of heterogeneous groups of investors. This relationship between project founders and investors is being connected by crowdfunding platforms, investors usually collect information about projects and the founder of projects through platforms or other social media, it is more a one-sided relationship which its ties are usually weak. And to measure the scale of bridging social capital, indicators such as the number of friends on social media platforms such as Facebook can be suggested (Lin et al, 2010). In the end, the measurements of bridging social capital will be used to illustrate the founder's social networks, more details about the measurement of the social network will be explained in the subsection below.

3.3 Social Network

The social network is the basic foundation of all forms of social structures. The relationship between social capital and crowdfunding performance has been verified positively correlated by multiple existing literature (Zheng et al, 2014; Colombo et al, 2014). It is rational to regard the social network as an essential aspect of social factors in crowdfunding success. By all means, social capital is more than just social networks, other dimensions of social capital such as cognitive features also play a role in crowdfunding success (Kromidha & Roboson, 2016). However, the effects of social networks on crowdfunding performance cannot be ignored when considering the close interrelationship between social capital and social network (Gaudeul & Giannetti, 2013).

By reviewing the selected literature about influencing factors of crowdfunding success, there are 3 out of 22 studies exclusively analyzed the potential effects of social networks on reward-based crowdfunding projects' performance. However, the authors of these 3 papers have put more focus on the quantitative analysis of data and did not put much effort into finding theoretical support about how social networks can potentially affect crowdfunding performance. To build on their research, a more thorough theoretical framework of the social network will be explained in the following paragraphs of this paper. Helping readers to have a better understanding of what is a social network, and how it is being connected to crowdfunding success.

Figure 1. An illustration of social network (Granjean, 2014)

In general, a social network can be understood as a social structure composed of various social actors such as individuals and organizations. These different social actors are being connected through varied dyadic social ties and interactions. Each social actor converges sets of social ties with many other social actors. In the end, the social networks and even entire societies are being constructed by countless different social ties between countless interacting social actors (Wasserman & Faust, 1994).

Primarily, social networks possess typical characteristics such as self-organizing, emergent, and complex. The diverse local interactions between different social actors coherently build up a global pattern. With the increasing size of the network, the formed patterns become more feasible (Newman et al, 2006). To study these patterns, social network analysis can be used to help researchers to observe the hidden information at different levels of scale. Social network analysis or "SNA" is the process that commonly uses theories such as graph theory and network theory to investigate social structures (Otte & Rousseau, 2002). It generalizes all network structures in terms of two major elements: The nudes that represent social actors within the network and the ties/edges/links that connect them. A large set of social structures including social media networks, business networks, knowledge networks, etc. can be illustrated through social network analysis (Grandjean, 2016; Brennecke & Rank, 2017; Harris et al, 2009). These networks are usually being presented through sociograms (example see Figure 1), these visualizations of social networks help researchers to reveal useful information within the networks by conducting qualitative assessments. It is also widely being used to analyze the behaviors of social actors and their and in-between dynamics on the internet (Ghanbarnejad et al, 2019), crowdfunding is an example in this category (Hekman & Brussee, 2013).

However, the scope of social network analysis is being restricted by constrained computing powers, human power, and many other rational factors (Kadushin, 2012). Thus, it is important to decide the level of analysis scope when conducting a social network analysis. Although the scopes of analysis are not always mutually exclusive, they can be generally divided into micro-level, meso-level, and macro-level (Blalock, 1960). The micro-level of analysis typically starts the examination with one-to-one interactions between individuals, including behaviors such as conversations, negotiations, and confrontations. In general, the meso-level represents a level that is between micro and macro. It refers to the analysis of the relationship between specific groups, communities, or organizations that is bigger than individuals but still a part of society. At last, macro-level analysis sees society as a whole, it takes a broader perspective of analyzing, and traces the impacts of interactions such as economics, politics, etc. The illustration of the three social levels can be found in figure 2 below.

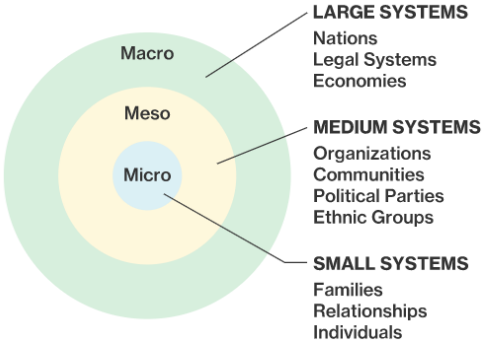

Figure 2. Levels of social netwrok (Malek-Ahmadi, 2020)

In this study, a simple social network analysis will be conducted in **section 4** to observe which possible groups of social actors are related to project founders (the nudes in sociogram). The most relevant social factors that may influence the crowdfunding success will be set as the independent variables in this study and be measured in **section 5**.

4. RESEARCH MODEL & HYPOTHESIS

To find the relevant independent variables to represent the crowdfunding founder's social network. It is necessary to identify the involved social actors within the project founder's social network in a crowdfunding process. For this purpose, a simple social network analysis centered around the crowdfunding founder will be conducted in this section.

As mentioned in the previous section, a meso-level of analysis should be done when studying the social network of a crowdfunding project founder. As an individual social actor (the central nude in sociogram), the project founder has a large number of ties with various other individuals. However, instead of looking at each related individual actor, it is easier to find their homogenous characteristics and set them as different social groups. This type of meso-level network is called a scale-free network according to the network theory. Different from the random network, a scale-free network is usually being characterized by "a degree distribution that unravels the size distribution of social groups" (Moreira et al, 2006). Different social actors in a scale-free network are being connected by different levels of "hubs", within each of these "hubs", actors are more closely related. In this section, the main purpose is to find these related "hubs" in a founder's social network and illustrate them in a sociogram.

In general, the related social actors in a founder's social network can be categorized into two board "hubs". The internal groups of social actors are being connected to the founder through the crowdfunding platform itself, and the other groups of social actors are being connected to the project founder through external sources such as social media. Although an interconnection exists between the two "hubs", the ties within the hubs are much closer and stronger.

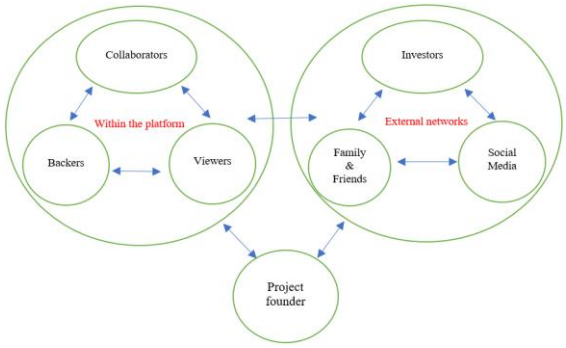

Figure 3. A sociogram of crowdfunding project founder

As can be seen in figure 3, each social group within these two "hubs" is all connected. The three major social groups within the platform are the project collaborators who formed collaborations with the founder on the crowdfunding projects, the project backers who supported the project by investing, and the viewers on the platform who haven't participated in the project yet. These three social groups are all being directly connected to the project founder by the crowdfunding platform itself, and they are closely connected. A viewer can easily become a backer by investing, and a collaborator can also be a backer at the same time. The second "hub" are different external social groups connected to the project founder through other means. There are also three external social groups. Investors such as venture capital companies connected to the project founder through investing activities. The personal ties of the project founder such as family members and friends can also be a potential source of funding (Agrawal et al, 2014). Other than these two, various external social media such as Facebook plays an important role in the crowdfunding process (Lu et al, 2014).

However, due to the difficulty in data collection, not all social groups in Figure 3 will be studied in this research. For example, the number of supported family members and friends of the project founder is rather a piece of private information, and very difficult to measure from an outside perspective. A similar problem also applies to external investors who are not investing through crowdfunding platforms. At the same time, the viewers on the crowdfunding platforms are also problematic to track, thus is excluded in this research as well.

Based on the remaining social groups, a research model is built in figure 4. Because of the positive relationship between the scale of social networks and social capital (Wang & Wellman, 2010; Gaudeul & Ginnetti, 2013). It can be assumed that the scale of each social group within the social network also positively correlated to social capital which ultimately contributes to crowdfunding success according to social capital theory.

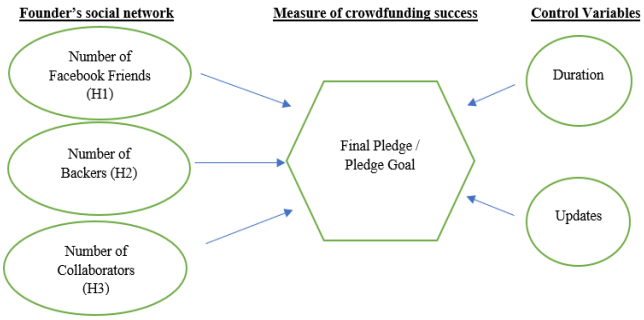

Figure 4. The research model

In the research model, the dependent variable is the crowdfunding success. Following the existing literature, the ratio between the final pledge amount and the pledge goal is decided to be used as the measurement of the success of a crowdfunding project (Zheng et al, 2014; Kromidha & Roboson, 2016).

The three independent variables that represent the founder's social network are the remaining social groups in the founder's sociogram in figure3. They are the number of the founder's Facebook friend/follower, the number of project collaborators, and the number of project backers. Besides these three research variables, two control variables are also included in this research model which affects the pledge/goal ratio. All of them will be further discussed in the subsections below, alongside with the hypothesis for independent variables.

4.1 Number of Collaborators

Collaborators of a crowdfunding project are people who are working or worked with the founder to bring a project to life. Collaborators usually connect to the project founder through different kinds of relationships. However, a high degree of trust is needed from the project founder to add a new collaborator to the project team. This is because a lot of private information related to the project is shared among all joined collaborators. The founder and his/her collaborators are working in a team environment, each of them takes different responsibilities when managing the crowdfunding project. Common activities of a collaborator include editing projects, managing community, and coordinating fulfillment (Kickstarter, 2020).

Marketing activities have been proven effective in promoting financial products (Shefrin & Statman, 1993), which can be also applied in crowdfunding. Marketing collaborators help founders to promote their crowdfunding projects to attract more investors which ultimately contributes to crowdfunding success. Furthermore, collaborators also play an essential role in the project community. Their daily management of the project and interactions with backers are crucial in crowdfunding success (Hui et al, 2014). Thus, it can be expected that

Hypothesis H1. The number of collaborators of the founder's positively contributes to the pledge/goal ratio.

4.2 Number of Backers

The backers are the people who have supported the founder's entrepreneurial project on crowdfunding platforms through financial means. People with different backgrounds are mutually connected to the founder and other backers by investing in the same project. Backers form a community themselves, and they communicate with each other through leaving comments on the crowdfunding platforms (Inbar & Brazilay, 2014).

In the study conducted by Kromidha & Robson (2016), it has been proved that a positive relationship exists between the number of backers' comments and crowdfunding performance according to social identity theory. Thus, it can be assumed that there is also a positive relationship between the number of backers and crowdfunding success since the number of backers' comments is directly influenced by the number of backers. The signaling theory also explains that people are more likely to invest in a crowdfunding project when it has more positive information. Furthermore, the number of backers can be seen as one of the most crucial criteria for potential investors since it reflects its success (Zhao et al, 2017). Moreover, the number of backers also directly influence crowdfunding success by investing in the project. Therefore, the following hypothesis can be assumed

Hypothesis H2. The number of backers of the founder's project positively contributes to the pledge/goal ratio.

4.3 Number of Facebook Friends

The number of Facebook friends of the project founder is the first independent variable. Undoubtedly, there are many other social media platforms. However, Facebook will be used as the only researched social media to represent the whole social media group, this is due to the complication in various existing social media, and the representativeness of the use of Facebook in crowdfunding studies (Mollick, 2014; Kromidha & Robson, 2016; Koch & Siering, 2015).

Normally, Facebook friends or followers of the founder acknowledge information about the founder's entrepreneurial projects through his/her social media page, which eventually guides them to the crowdfunding platform to acquire more relevant information about the project when they are interested. Multiple existing studies have already found out the positive correlation between the number of founder's Facebook friends and his/her crowdfunding success (Wessel et al, 2016; Hekman & Rogier, 2013; Thies et al, 2014). This correlation can be assumed in this study as well. The number of Facebook friends is being used as an indicator to represent the general scale of the founder's social media network. Because the scale of the founder's social media networks effects crowdfunding performance positively (Hui et al, 2014), which leads to

Hypothesis H3. The number of Facebook friends of the founder positively contributes to the pledge/goal ratio.

4.4 Control Variables

Besides the influence of the founder's social networks, other factors also affect crowdfunding success. According to the reviewed literature, it can be concluded that there are two major variables that should set as control variables in this research.

The first control variable is the time duration of the crowdfunding project. There is an argument that the duration of the funding period directly influences the final performance of a project (Koch & Siering, 2015). A higher pledging amount can be predicted as more viewers (potential investors) will notice and participate in the project with its increasing duration on a crowdfunding platform.

The second control variable would be the number of updates that a project has during its funding period. According to the signaling theory, the founder and his/her collaborated team release positive signals to backers and viewers by updating information about the project frequently. These positive signals attract more potential investors to become a part of the community by investing (Kromidha & Robson, 2016).

5. RESAERCH METHOD

To test the hypothesis, a linear regression model is constructed based on the research model in figure 4, to connect all independent variables, control variables, and dependent variables. This regression model will be tested in the following subsections with the use of the dataset that consists of 50 observed crowdfunding projects.

$$Y_{success} = \beta_0 + \beta_1 No.FacebookFriends + \beta_2 No.Collaborators + \beta_3 No.Backers + \beta_4 Duration + \beta_4 Updates + e$$

5.1 Data Collection

The data of all relevant variables in this research are being collected from Kickstarter.com. In total, 86 crowdfunding projects on Kisckstarter.com are observed, and 50 of them are used as researched samples considering all limitations. All projects are selected from the category of technology during the two months period between March 2020 to May 2020. The exclusion of projects from other categories helps to ignore the effects of project categories on crowdfunding performance (Fernandez-Blanco et al, 2020). Due to the relatively short research timeframe and limited project category, the amount of technological crowdfunding projects that have been successfully completed is limited. Thus, the research sample size in this study is commonly much less compared to other existing similar studies.

Kickstarter is an American public benefit corporation founded in 2009, based in Brooklyn, New York (Issac & Gelles, 2015). Kickstarter maintains the biggest rewards-based crowdfunding platform over the world (Miller, 2019). By May 2020, Kickstarter has reached $5 billion of received funds from over 17.9 million backers over the world, and it has successfully funded 182,188 different entrepreneurial projects. In general, the crowdfunding projects on Kickstarter are being classified into different categories by the platform, the categories commonly include fashion, food, art, games, design, technology, crafts, etc. Among all these project categories, the games, design, and technology section have collected the most funds with the highest number of live projects (Kickstarter, 2020).

As described in table 2. There are three independent variables, two control variables and one independent variable that needs to be observed and measured. Starting with the independent variable, the ratio of the final pledge divided by the pledge goal

can be used as a clear indicator for crowdfunding success according to other studies (Lambert & Schwienbacher, 2010). For dependent variables, all three measurements are clear by counting the number of Facebook friends, backers, and collaborators for project founder in each observed project. The number of backers and collaborators are provided on the project page of the Kickstarter website, which can be directly observed. However, the number of Facebook friends of the founder needs to be separated collected through tracking their Facebook page.

In the end, both control variables can also be easily collected from the Kickstarter website. The time duration of a project is the period from the beginning to the end, which can be calculated easily. And the number of updates is simply the number of times that the founder and his/her collaborating team updates the project within the funding duration, which is directly stated on the project page.

Table 2. Definitions of variables

Variable	Description
Pledge/Goal Ratio	Actual pleged amount divided by plege goal
N_Collaborators	Number of collaborators of a crowdfunding project
N_ Backers	Number of backers of a crowdfunding project
N_Facebook Friends	Number of Facebook friends/followers the founder has
N_Updates	Number of updates the project had at the end of duration
Duration	Total Duration of funding in days

5.2 Descriptive Statistics

The descriptive statistics of the 50 successful crowdfunding projects can be found in Table 3. From the standard deviation of all variables, it can be seen that the situations between different observed projects vary to a large extent. The deviations in independent variables are apparent, especially in the number of backers (SD: 13906.53) and the number of Facebook friends (SD: 6313). Comparing the standard deviation of these two variables to other reviewed studies (Koch & Siering, 2015; Fernandez-Blanco et al, 2020), results obtained in this paper are much higher with relatively close variable range. The reason for this is due to the very limited sample size in this research compared to the others. With an extension of observing period and increase of samples, it can be expected that the standard deviation of all variables will decrease.

For the number of collaborators (SD: 3.27), it can be seen that not all successful projects have/had a collaborator. For the majority of projects that have, collaborators for marketing and promotion purposes are the most common. For control variables, the duration of all 50 projects (SD: 10.14) is close to the timeframe of one month. The number of updates for each project also varies (SD: 8.81), where one project updated 51 times compared to some of those didn't provide any updates during its duration. The standard deviation of these three variables is much smaller than the two mentioned above, and they are closer to their mean value. This indicates the data used in this research are more closely distribute. Their mean values are also closer when compared to prior studies (Koch & Siering, 2015; Fernandez-Blanco et al, 2020).

For the dependent variable (SD:48.97), the minimum pledge/goal ratio has to be equal or bigger than 1. This is because all observed targets are successful crowdfunding projects, and a crowdfunding project can only be defined as successful if it reaches its pledging goal. The minimum pledge/goal ratio in all projects is 1.16, which means the received funding exceeds 16% more than the initial pledging goal. Extremely successful projects exist in the dataset of this paper, one that collected more than 230 times of funding than its initial goal. It can be seen that the average pledge/goal in this sample is much higher than prior studies due to the choosing criteria described in **section 5.1**.

In table 4, the correlations between variables are presented. By observing all correlations to the independent variable, it can be concluded that there are no highly correlated relationships. It can be seen that the number of Facebook friends of the founder and the number of updates has almost no correlation to the crowdfunding success in the collected sample since all their correlation to pledge/goal ratio is smaller than 0.1. The highest correlation is the table is the correlation between the number of backers and the number of updates, where it has 0.702. This high correlation between the number of backers and the number of updates raises the problem of multicollinearity (Tachnick & Fidell, 1996). By adjusting this problem, a another model is added that excludes the number of updates as a control variable in **section 5.3**.

Table 3. Descriptive statistics

Variables	Mean	Median	Maximum	Minimum	Std.dev
Pledge/Goal	33.36	14.12	238.66	1.16	48.97
N_Collaborators	4.72	4	13	0	3.27
N_Backers	6903.4	2234	83193	40	13906.53
N_Facebook friends	3246.7	926.5	35962	7	6313.59
N_Updates	7.98	6	51	0	8.81
Duration	36.1	31	60	14	10.14

Table 4. Variable correlations

	1	*2*	*3*	*4*	*5*	*6*
1. Pledge/goal	1.000					
2. N_Backers	0.329	1.000				
3. N_Collaborators	0.316	0.356	1.000			
4. N_Facebook Friends	0.073	0.164	0.227	1.000		
5. N_Updates	-0.061	0.702	0.262	0.223	1.000	
6. Duration	0.348	0.001	0.127	-0.023	-0.052	1.000

5.3 Analysis Results

By inputting the collected data into the linear regression model, the results of the analysis are presented in Table 5. In total, five different models have tested to strengthen the robustness of the result. For the first three models, each independent variable that represents the influence of social networks is included as the only existing variable to test their hypothesized effects. In model 4, only control variables are included, whereas model 5 also includes the three independent variables. Due to the multicollinearity problem found in table 4, model 6 excludes the number of updates as a control variable while includes all other variables.

As can be seen in the first three models, only the number of backers has been proven it has a significant effect (p=0.019) on crowdfunding success with a 10% significance level while eliminates the influence of other variables in model 2. Moreover, the adjusted R square of all three is rather low whereas model 2 even has a negative number. The results of the adjusted R square indicate that the first three models are rather insufficient.

By comparing model 4 and model 5, it can be seen that the adjusted R squared of model 4 is much lower than model 5. Thus, the model is improved after adding the three social network variables. This proves the social network factors do have an influence on crowdfunding performance overall. Looking at table 5, the adjusted R square model 6 is also lower than model 5, and the significance level of each variable decreases. This indicates that the model is better off when the number of updates is included as a control variable. However, this result contradicts the multicollinearity problem found in table 4 of the correlation

between variables. The explanation of this contradiction is maybe due to the relatively small sample size. It needs to be further tested in future research with a larger sample.

By looking at model 3 and model 5, the p-value of the independent variable number of Facebook friends is too high ($p > 0.6$). This indicates that the influence of the number of Facebook friends of the founder does not play a significant role in crowdfunding success according to the sample of this paper, which rejects the hypothesis H1. By adding model 7 that excludes the number of Facebook friends as an independent variable, the overall quality of model increases as adjusted R squared increases. This further confirms that the number of Facebook friends of a crowdfunding backer does not have a significant effect on crowdfunding success.

Furthermore, both the number of collaborators and the number of backers have a significant influence on the crowdfunding success. For the number of collaborators, its influence on crowdfunding success is significant at a 10% level of confidence ($p = 0.096$). Regarding the number of backers, it can be seen that it is significant even at a 1% level of confidence ($p = 0.001$). It indicates the high significance of the influence of the number of backers on the crowdfunding success. Therefore, both hypotheses H2 and H3 are supported by the provided evidence according to the models.

For the two control variables, both have a significant influence on crowdfunding success at a 10% level of confidence. However, the number of updates has a negative effect on crowdfunding success according to the negative coefficients in presented regression models.

Table 5. Regression Models

This table represents the regressions in which the dependent variable is the pledge/goal ratio. The p-values of each variables are presented in the brackets with significance levels of *=10%,**=5% and***=1%.

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)
N_Collborators	4.736				1.432	2.721	1.561
	(0.125)				(0.096)	(0.105)	(0.092)
N_Backers		0.001			0.002	0.001	0.002
		(0.019)			(0.001)	(0.001)	(0.001)
N_Facebook Friends			0.001		0.001	0.001	
			(0.616)		(0.640)	(0.972)	
N_Updates				-0.240	-3.127		-3.063
				(0.753)	(0.001)		(0.001)
Duration				1.669	1.433	1.567	1.422
				(0.015)	(0.015)	(0.016)	(0.014)
Adj R Squared	0.101	0.089	-0.151	0.086	0.347	0.191	0.359
N_Obs	50	50	50	50	50	50	50

6. CONCLUSION

6.1 Conclusion

The research examines the relationship between crowdfunding founder's social network and crowdfunding success. First, the social capital theory is used to demonstrate how the structural dimension of social capital: the social network is connected to crowdfunding projects. Second, the use of social network theory and social network analysis helped to further identify the relevant social groups within the crowdfunding founder's social network. Furthermore, these relevant social groups are set as independent variables of this research to represent the crowdfunding founder's social network. At last, a linear regression model analysis was conducted to investigate the significant effects of each of these social groups on crowdfunding success.

The results indicate the number of collaborators of a crowdfunding project is a significant factor in crowdfunding success (**H1**). The number of collaborators of a project represents the scale of the collaborator group, which is an essential part of the founder's social network. Moreover, the number of backers has also been tested for a significant positive effect on crowdfunding success (**H2**). The number of backers indicates the size of the internal community on the platform of a crowdfunding project, which is an essential part within the founder's social network,

However, there is not enough evidence to find the significant effect of the number of Facebook friends of the crowdfunding founder on crowdfunding success. Therefore, the hypothesis **H3** is rejected based on the observed sample. This result contradicts the reviewed literature (Mollick, 2014; Kromidha & Robson, 2016), who have found there is a positive relationship between the number of Facebook friends and crowdfunding performance.

To summarize, the social capital theory and social network analysis was used to help identify how crowdfunding founder's social network influence crowdfunding success. The result of prior studies have been extended. The founder's social network has also been broke down into different social groups. Furthermore, the relationship between different social groups and crowdfunding success have been separately tested.

6.2 Limitation and Future Research

There are several limitations to this research. First of all, due to time constraints, the number of Facebook friends/followers are used as the only indicator to represent the founder's network on social media. The social ties of the founder on other social media such as Twitter, LinkedIn, etc. should also be considered in future research when measuring the scale of the founder's social network.

Secondly, more control variables could be included in the research model. According to a reviewed literature (Koch & Siering, 2015), multiple relevant factors have an influence on crowdfunding performance such as depth of project description, founder's prior experiences, and the availability of video, etc. that are not being considered in this research. The inclusion of more relevant control variables will further improve the accuracy of the result.

Thirdly, the observed sample size is relatively small in this study. This is due to multiple choosing criteria of the sample in such a limited research timeframe (within two months). For future research, a longer observation time is necessary to collect more relevant data.

In general, the three major limitations of this research can be overcome by improving the existing research model and data collection process. Specifically, a more accurate research result can be expected in future research by detailing independent variables, expanding control variables, and increasing the sample size.

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