Ph.D. Dissertation of Engineering

Entrepreneurial financing strategy focusing on crowdfunded startups with novel ideas

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Abstract

This thesis explores startups' fundraising and development strategies that started from novel ideas to sustainable companies through crowdfunding. From the stage of persuasion by presenting novel ideas to subsequent business development, the study analyzes the factors that enable startups to grow successfully through crowdfunding and accordingly reveals what an effective action strategy from the entrepreneur's point of view is. The purpose of the thesis is to understand the cycle of the campaign, value delivery, and subsequent development while focusing on the strategic perspective of entrepreneurs using crowdfunding as an entrepreneurial fundraising tool.

First, at the fundraising point, which is the beginning of crowdfunding startups, the study focuses on indicators that can measure an idea's novelty and explore the behavioral strategies of founders during crowdfunding campaigns according to the degree of novelty. This study proposes a machine learning-based methodological measurement to understand the novelty and presents a behavioral strategy using the method. The study demonstrates that the novelty of an idea is a crucial element in changing the direction project founders must act for successful fundraising in reward-based crowdfunding. The second study proposes a framework for a satisfactory crowdfunding experience for reward-based crowdfunding participants. Through the framework of utilitarian-hedonic value delivery borrowed from consumer research, the study finds the determinants of how founders deliver value to crowdfunding participants after realizing business ideas. This study explores the post-campaign idea implementation and satisfaction delivery process, taking preliminary steps to broadly understand the subsequent business processes after fundraising. The third study examines the differences in characteristics of crowdfunding startups that have attracted follow-up venture funds. In particular, the study analyzes how the timing and valuation of follow-up venture financing are affected by the characteristics of the crowdfunding campaign process. This study in-depth finds the relationship between the process of crowdfunding and long-term sustainable startups.

Keyword: Novelty, Entrepreneurial Finance, Crowdfunding, Entrepreneurship. Startup
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Table of Contents

Chapter 1. Introduction

1.1. Research Background

The birth and development of innovative startup is the key to economic development (Schumpeter 1934; Fagerberg et al., 2010). Entrepreneurship and related startup industry is considered crucial for innovation and global growth (Wennekers and Thurik, 1999; Baumol, 2002), and this importance is emphasized as the economic structure becomes more complex. There are many factors that influence the emergence of innovative startups, but one that cannot be left out is the appropriate use of venture funds that accompany the rapid growth process (Block et al, 2018). Business growth by attracting appropriate funds in the startup process is a significant challenge and milestone for founders as well.

Against this backdrop, entrepreneurial finance markets are snowballing. According to the OECD, venture capital investment reached 332.8 billion dollars in the United States alone in 2021, which is more than ten times more than 32 billion dollars 10 years ago. In addition, with the development of IT technology and the emergence of the platform economy, entrepreneurial finance markets are also facing a dynamic state change. New market niches such as crowdfunding and initial coin offerings emerged and raised expectations as important entrepreneurial finance market segments. The new format brought different aspects and rules from fundraising centered on venture capital. These methods are more public direct, participatory, and real-time emphasized.

In line with these changes, the academic entrepreneurial finance field has also paid

attention to the emergence of new niches. Research on the shape, success factors, and nurture of startups through new funding methods has been actively conducted by researchers recently. These new fundraising methods are gradually taking over the market and their growth potential is being actively researched, but what remains in doubt is whether they really play a role in leading to successful and sustainable startups. There is a lack of consideration on what process contributes to the birth of innovative companies at the startup industry level and, on the contrary, how the founders can use this as a process to create innovation rather than a simple one-time attraction of funds.

Global crowdfunding market size was expected as $84 billion in 2018 and $114 billion in 2021. The US accounts for 42% of the total market, and English-speaking countries, including the UK and Canada account for more than 60% of the total market. The reason for such explosive growth is because of the 'directness' of crowdfunding. People who participate in crowdfunding give meaning to directly participating in the birth of innovation. Crowdfunding exists in various forms, but among them, the above characteristics are most prominent in the reward-based model. In this model, participants become funders and first buyers for the implementation of new ideas, and founders who present ideas actually make products when they receive enough attention. Therefore, from the founder's point of view, the reward model's crowdfunding acts as both funds securing and market demand signal securing. Due to this, it shows a different aspect from the traditional capital provider-seeker relationship. In this context, innovative products and ventures such as Peloton and Oculus VR were born. The peloton began as a novel device

idea that enables professionally assisted workouts at home as exercise equipment and media companies. Starting with successful funding at Kickstarter.com in 2012, it attracted both market reaction and follow-up venture capital investment, and it has since grown into a successful innovator with over 1,800 employees and $ 4 billion in corporate value. This is a symbol of innovation achieved through the participation of the public participating from the initial idea stage to what kind of innovative product people want.

At the same time as these innovations and possibilities, crowdfunding platforms and project practices do not precisely fit the original ideal. Most fund-seeking projects through reward-based crowdfunding aim to simply attract funds and have no intention to develop it through legit business process, and in many cases are degenerating into regular e-commerce with banal idea-based projects. Even after successfully completing a project and building a product, many founders have limitations that they do not go further. For these reasons, over the past decade, funding mechanisms such as crowdfunding have been devalued for their value in the innovation process.

Nevertheless, crowdfunding is an area of unlimited potential and possibility for future development. Especially in the era of decision-making transfer and the emerging of decentralizing governance, crowd-centered entrepreneurial finance market expansion is an irresistible trend. Academic understanding of follow-up development processes after crowdfunding will play a role in finding a link between crowdfunding and innovation in this trend.

1.2 Research Objectives

The objective of the thesis is to explore the role of crowdfunding as an initial fundraising tool and process that influence subsequent development from the entrepreneur's perspective. In this process, the thesis aims to investigate fundraising strategy and subsequent results during and after fundraising that the founder should consider when selecting crowdfunding as an entrepreneurial financing method.

Based on these concerns, this thesis aims to clearly explore the role and value of crowdfunding in the process of a novel idea developing into a successful startup and to derive strategic implications for entrepreneurs in the process. To this end, the thesis consists of multiple studies considering sequential stages of the startup development process through crowdfunding, understanding the novelty of ideas, conducting strategic action analysis of the crowdfunding process, exploring the idea implementation and satisfactory delivery process after fundraising, and subsequent funding attracting characteristics.

Through this, the business development process through crowdfunding is specified, and practical strategies at each stage are systematized. The study aims to provide startup practitioners with practical strategic implications in addition to exploring the theoretical background and framework. In accordance with this thesis's main goal, we empirically analyze the characteristics at each stage and propose computational social science tools necessary for enhancing the process. Finally, to this end, the thesis tries to achieve an in-depth understanding of the successful startup process through crowdfunding,

along with the combination of various research methodologies and multidisciplinary theories.

1.3 Research Outline

The remainder of the thesis is structured as follows. The following chapter provides a brief summary of the literature on entrepreneurial financing and innovation studies related to idea realization process. Theories and practices related to the financing of novel idea-based startup and development processes are dealt with in the chapter to enrich understanding and find possibilities in research development. Chapter 2 also examines the missing link to understanding crowdfunding as an innovative startup funding based on the previous research summarized and defines a developmental research question to construct and enrich the research flow. Finally, the contribution of the thesis is discussed based on the literature review.

Following the literature review section, Chapter 3 focuses on indicators of novelty and explores three strategic elements of the founder's action during the crowdfunding campaign. The study proposes methodological approach of understanding ex-ante novelty, and further develops implementation feature of the metric. Furthermore, Chapter 3 empirically tests that the idea's novelty acts a key factor in transforming the direction in which a project founder should act for successful fundraising on reward-based crowdfunding.

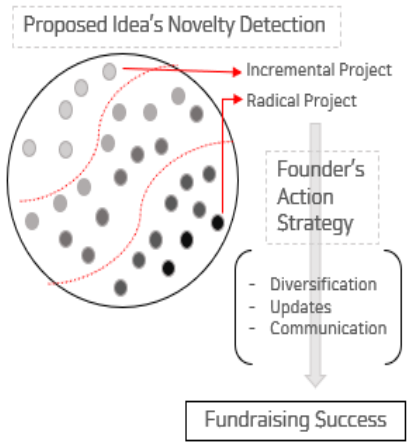
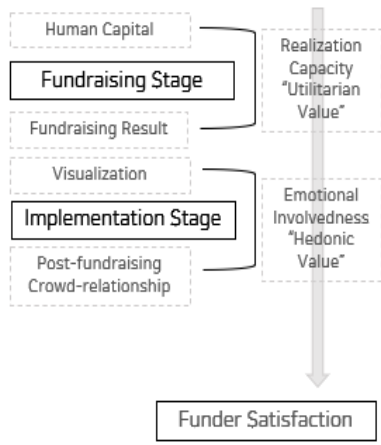
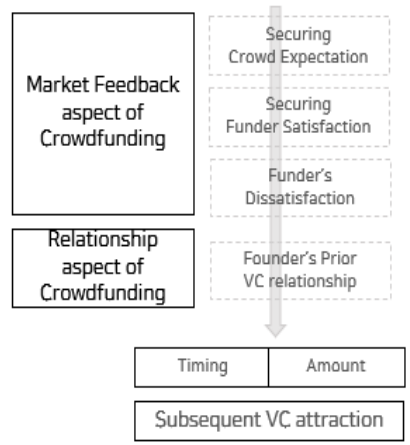
Chapter 4 proposes framework for reward-based crowdfunding participants'

crowdfunding experience satisfactory. Through the frame of utilitarian and hedonic value delivery borrowed from consumer research, crowdfunding traits are explored to find the determinants that deliver value to participants. The study presents a framework for widely understanding the subsequent business development process, which leads to idea implementation and delivery satisfaction in the crowdfunded startup after fundraising.

Chapter 5 explores the characteristics of crowdfunded startups that attracted follow-up venture funding. In particular, the timing of subsequent venture funding and the valuation are considered, and the effects of features in the crowdfunding process on subsequent funding are analyzed. Through this, the study conducted in-depth research the link between the process of crowdfunding and the development of a long-term sustainable startup.

Finally, Chapter 6 concludes the overall studies by summarizing key findings and presents implication to practical fields. Contribution of the studies and further research possibilities from limitation is also discussed.

Figure 1 Overall thesis structure

	Essay 1	Essay 2	Essay 3
Topic	Idea novelty and fundraising strategy	Securing satisfaction in post-crowdfunding stage	Subsequent VC financing for Crowdfunded startup
Conceptualization			
Idea Realization	Idea championing stage	Idea implementation stage	Idea Impact stage
Founding through Crowdfunding	Fundraising campaign	Post-crowdfunding implementation	Post-crowdfunding investment attraction
Theoretical Background	Signaling theory, New story detection	Customer theory, Two-factor theory	Venture-stage growth, signaling theory
Methodology	Machine-learning-based novelty detection, OLS/Tobit/Negative Binomial Regression	Text-based sentiment analysis, Weighted least square regression	Text-matching, Stepwise OLS regression, Negative Binomial regression

Chapter 2. Literature Review

2.1 Entrepreneurial Financing

Securing financial capital is a crucial condition in the process of deriving a high-growth venture from a novel idea. Entrepreneurs pursuing the venture-growth strategy do this by attractively introducing ones' business to the capital provider and attracting investment. A practical form of entrepreneurial finance emerged in the 1950s as commercialization from innovative technologies became active, and many entrepreneurs actively pursued potential ventures with their endeavors (Drover et al., 2017). Academic research on the definition, value, and role process of venture capital was actively conducted in the 1980s and was mostly conducted systematic research on the ecosystem of venture capital and high-growth venture (e.g., Bygrave, 1988; Florida & Kenney, 1988; Elango et al., 1995). Venture ecosystems have become increasingly prevalent and sophisticated over time. More recently, in addition to venture capital, various types of entrepreneurial financing capital providers have appeared, a deeper understanding of venture capital from a different perspective has been widely accepted, and studies on relationships and networks between additional types of funding have emerged.

2.1.1 Venture Capital

Venture capital is a professional investor or investing institution that aims to fund potential high-growth startups (Drover et al., 2017). General form of venture capital

manages investments in ventures with a complex portfolio. Venture capital is key player in the entrepreneurial process and is indispensable to the landscape of the founder. As the research on this ecosystem continued, the early discussion was about the value and role of venture capital. Subsequently, decision-making criteria and processes in venture capital investment decisions attracted the attention of researchers. Researchers dealing with the interactive and contingent nature of the venture capital investment review process emphasized their interaction with entrepreneurs (Kirsch et al., 2009; Petty & Gruber, 2011). They saw Entrepreneurial passion and motivation as the driving factors behind venture capital investment decisions. In the relationship with startups, the importance of the effect from everyday experiences between founders and venture capitalists (Franke et al., 2006), co-ethnicity (Hsu, 2015), and due diligence impacts on evaluative stages (Petty & Gruber, 2011) was actively discussed among researchers. On the other hand, Chen et al. (2009) argued that beyond the role of passion, the preparedness of a startup to be invested is a more decisive factor in decision-making. In addition, it was found that decisions from the management's competency are essential criteria such as execution skills of chief executives (Kaplan et al., 2012). Besides, research on the entrepreneurial value of venture capital was followed. Researchers analyzed their value-adding perspective by addressing the role of venture capitalists in providing strategic guidance for the exit of a successful investment, as well as merely providing finance (Dimov & Shepherd, 2005; Sørenson, 2007). Venture capital investments have had a certification effect or have shown a favorable effect on corporate value evaluation in subsequent exit events such as IPO (Pollock et al., 2010).

Another important research stream is the study of the strategic elements that venture capital as an individual capital provider can do. Among scholars who have dealt with venture capital's individual strategy research, risk mitigation strategies among portfolios have been the main focus of investment strategy discussion. To this end, multi-stage investment, which divides risks according to the growth stages of startups, has been recognized as a theoretical value and established as a practical form of investment in the venture capital industry (Grenadier & Malenko, 2011; Li, 2008; Tian, 2011). Accordingly, studies have been conducted to analyze renegotiation patterns according to each venture growth stage or to deal with valuation at different stages (Arcot, 2014; Hellman, 2006). Risk variance and synergy effects through syndication among investors were analyzed (Gu & Lu, 2014; Keil et al., 2010). Meanwhile, the legal perspective of venture capital investment type for optimal risk management and research on investment contract mechanism continued (Arcot, 2014; Hellman, 2006).

In addition to the original form, venture capital has been developed and transformed into various capital providers for entrepreneurial processes. The early systemic interests followed similarly in other forms. Corporate venture capitalists (CVCs), which emerged as an organization of an existing company in a complex form, followed a lot of research and theoretical development. Angel investors appeared in entrepreneurial finance, focusing on the early stage in a slightly different form from the institutional form, and studies on this were actively conducted. Researchers, they are dealt with characteristics such as greatly influenced by stage-dependent cognitive processes (Maxwell et al., 2011),

and decision-making rely on intuition and heuristic-based reasoning (Huang & Pearce, 2015) differ from established venture capital. Entrepreneur's perspective of attracting venture capital was practically essential, but theoretical development was less mature and was not actively discussed among academic researchers.

2.1.2 Crowdfunding

Crowdfunding has emerged as a relatively new source of funding for novel idea-based startups. Online crowdfunding became popular in the first form supporting art-related projects (Meinshausen, Schiereck, and Stimeier, 2012) or creative areas for novel content. With the development of the online platform, it developed into funding that complemented traditional entrepreneurial finance and began to attract academic and practical attention for early-stage venture financing sources (Meinshausen et al., 2012). It was noted for its role in reducing the funding gap in the early stages, which venture capital or even business angels did not reach (Collins & Pierrakis, 2012). Moreover, as the size of venture capital expanded and the tendency to favor stable investment in relatively late phases (Robb & Robinson, 2014), the funding gap issue became an important topic throughout entrepreneurial financing practice (Collins & Pierrakis, 2012). These crowdfunding forms of capital are subdivided into several forms (e.g., donation-based, reward-based, lending-based, and equity-based), and each form has its own specific characteristic. However, the definition of attracting funds from a large non-professional number of capital providers is the same. Therefore, multidisciplinary research was actively conducted on the overall

nature, and at the same time, values and characteristics of a specific type were also actively analyzed (Collins & Pierrakis, 2012; Giudici, Nava, Rossi Lamastra, & Verecondo, 2012).

Similar to other cases of the entrepreneurial financing field, crowdfunding research arena has been developed in three broad categories; Entrepreneurs' perspective of capital seeking, Investors' perspective of capital providing, General scientific discussion, and focusing on the macro meaning of crowdfunding in venture ecosystem (Moritz & Block, 2018). The perspective of understanding crowdfunding differed according to each of these, and implications derived from conclusions also changed accordingly. In the early stages of research, scholars primarily dealt with the theoretical model, but qualitative empirical studies based on interviews (Aitamurto, 2011; Hemer et al., 2011; Ley & Weaven, 2011) and mass analysis using online platform-based quantitative data began to emerge.

2.1.2.1 Crowdfunding in entrepreneur perspectives

Understanding crowdfunding as a fundraising option from Entrepreneur's perspective has excellent implications for practitioners. There are two main ways to explore this point of view. The first is the quest for motivations for choosing to crowdfund beyond other capital selections. Belleflamme et al. (2013) explored the incentive to participate through a survey of entrepreneurs with experience in crowdfunding, and of course, the first reason was securing funds. However, an important implication is that the public's attention and receiving feedback is considered essential secondary motivation for choosing to crowdfund. Gerber et al. (2012) framed motivation into five types: financing, forming

relationships, self-affirmation, replication, and increased awareness. As discussed in the study of the value of crowdfunding, the role of early-stage funding to fill the early-stage gap is the goal most seekers seek from crowdfunding. Other choice factors were speed and flexibility, market testing, and signaling to further market. (Hemer et al., 2011; Hienerth & Riar, 2013). Typically, the main effect of market signaling through crowdfunding is to help to build a customer base. Burtch et al. (2013) also emphasized the effect of visibility and higher product consumption after a crowdfunding project. Mollick and Kuppuswamy (2014) also saw the effect of better access to the customer as a benefit that can be achieved through crowdfunding. Entrepreneurs also exploited their market potential while contacting prospective customers in the process of crowdfunding fundraising (Belleflamme et al., 2010; Hu et al., 2014).

Determinants of fundraising success is a significant area of interest for entrepreneurs seeking finance. In crowdfunding research, the exploration of elements for successful projects has been extensively performed. Initially, crowdfunding participants prefer to invest in a social or non-profit-oriented background (Belleflamme et al., 2010), and it is considered a capital attraction structure suitable for social entrepreneurship (Lehner, 2013). Since mass research data became available afterward, various types of general success factors were explored. Mollick (2014) explored the effect of funding amount and duration settings on project success. The founder's social capital, such as Facebook friends or funding experience on the platform, was considered a positive influx of investors (Mollick & Kuppuswamy, 2014; Agrawal et al., 2011). Human capital factors, such as the founder's

educational background and project experience, were also positively evaluated for crowdfunding success. Emotional (Lin & Viswanathan, 2013) and cultural (Burtch et al., 2013) factors were also treated as success determinants, and geographical proximity to the founder was also a characteristic driving success (Frydrych et al., 2014; Saxton & Wang, 2013; Agrawal et al., 2011). The effects of how to describe ideas on the platform were also explored, such as detailed idea description, use of easily-readable language, and use of graphical description such as images or videos as effective strategies. Recently, the strategic action that can be performed in the fundraising period beyond the project setting is also attracting attention, and a representative one is a study examining the effects of the type and frequency of real-time information updates (Block et al., 2018; Xu et al., 2014). While dealing with crowdfunding from an Entrepreneur perspective, I also covered legal aspects to consider while equity crowdfunding is for extra consideration (e.g., Wroldsen, 2013; Cumming & Johan, 2013).

2.1.2.2 Crowdfunding in investor perspectives

The study from the crowd perspective of investing in crowdfunding deals with the motives of capital providers and factors that influence the investment decision. The initial study examined motivation and incentives by interviewing participants. The main crowdfunding participants were innovation-oriented and interested in interacting with social development (Ordanini et al., 2011; Gerber et al., 2012). Some were interested in the financial return itself or were rewarded with identifying the products being developed

and the process of shareholder participation in the company itself. These results show that non-financial rewards are also crucial in crowdfunding motivation. The other theoretical analyses for participation motivations also emphasized the provision of social reputation and intrinsic motivation (Allison et al., 2014; Lin et al., 2014). Hemer et al. (2011) emphasized the enjoyment and self-affirmation of the participation process itself. Belleflamme et al. (2013) also participated in the project and analyzed the realization of the project itself and the psychology of crowdfunding participants who were interested and rewarded.

In addition to the motivation for participation, studies on determinants making decision-making were also active. The socio-psychological herding effect was emphasized, and many non-professional aspects of deciding investment intentions by imitating others' investment decisions appeared to crowdfund participants (Lee & Lee, 2012; Kuppuswamy & Bayus, 2013). In the same vein, several studies dealt with the influence of the surrounding network and the decision-making effect of social networks (Everett, 2010; Liu et al., 2013; Zvilichovsky et al., 2013). Therefore, it was revealed that active promotional activities have a direct effect as a motive for making investment decisions (Lu et al., 2014). Such promotions may be from social influencers (Qiu, 2013) or from investment experts' recommendations (Kim & Viswanathan, 2013), and recommendations from nearby friends (Moritz et al., 2014). Word-of-mouth was emphasized in the investment decision. Some view funding decisions are based on the fact that crowds could pre-purchase reasonably good products cheaper than buying existing products in the market as a reward-based

crowdfunding project. Ahlers et al. (2013) saw the founding team's high level of education and plenty of board members helps to make investment decisions, on the founder's idea implementation capacity view. This is similar to the professional decision-making model in traditional venture capital (Mollick, 2013).

There exist other scientific aspects dealing factors for crowdfunding platform itself. Chen et al. (2013) considered crowdfunding that developed as an auction model, and Doshi (2014) and Maeschle (2012) conducted an analysis of the platform type. Reducing information asymmetries through information formation reduces worries about possible risks (Elsner, 2013; Haas, Blohm, & Leimeister, 2014). Platform also contributes to helping participants to build trust (Burtch et al., 2013a; Greiner & Wang, 2010), and funding design timing should be properly arranged to be beneficial for the overall achievement of the platform (Wash & Solomon, 2014).

2.2 Idea Realization

Ideas are born in novel forms and lead to innovation through several stages. This creative process starts with novelty or heterogeneity, in which value cannot be judged at first (Amabile, 1983; Simonton, 1984). Considering this process as the idea journey, plenty of studies were conducted, and the idea realization stage can be divided into four stages; idea generation, idea elaboration, idea championing, and idea implementation (Perry-Smith & Mannucci, 2017). The idea generation phase, the starting stage for realization, is the process of devising novel ideas and self-selecting promising usefulness through

possibility evaluation (Simonton, 2003). The primary purpose is to find a potentially valuable idea, not simply to produce a large number of ideas (Paulus & Dzindolet, 1993). One must select a candidate and move on to the next step, elaboration stage involves further clarifying potentials (Staw, 1990). Research on this stage has been heavily covered at the individual level by creativity theorists. Through review, feedback on ideas and making improvements are accompanied (Mainemelis, 2010). Refined ideas need to recruit the necessary resources before final implementation. The championing phase for this is accompanied by active promotion, leading to approval and funding for novel ideas (Howell & Higgins, 1990; Kanter, 1983). This may be approval of a project inside the company, or an idea competition in the process of attracting an external business angel or crowdfunding. At this stage, most novel ideas fail and are discarded as funding can move on to the next stage. Strategic decision-making to move forward is done at this stage, and the strategy for attracting investors is also a resource attraction for successfully promoting this stage (Anand et al., 2007). Finally, the project idea that succeeded in attracting resources goes through the idea implementation stage. Idea state is now turned into something tangible, whether it is a product, a service, or a process. The factors that create this capacity were discussed in sharing a vision of implementing organizations (Cardinal, 2001), communication (ingo & O'Mahony, 2010), and responsible ownership sharing (Fleming et al., 2007).

2.2.1 Signaling theory

Signaling situations involve the signaler, receivers, and signal contents (Connelly et al., 2011). For crowdfunding cases, myriad individuals may observe multiple signals sent by the project's founder, and the strategic focus is on conveying the founder's confidence in project value. The valuation of novel ideas can vary from person to person, but the confidence of a founder in the context of information asymmetry inspires general positive expectations. In this context, effectively delivering a positive signal to the receiver is a compelling strategic action to produce positive results. There are two chief characteristics of efficacious signals: signal observability and signal cost of the signal contents (Connelly et al., 2011). Observability refers to the availability to notice the positive message of the signal. Therefore, the founder needs to ensure that the prospective investor fully understands and accepts the additional information on the contents of the idea that he intends to convey with intention (Warner et al., 2006; Gao & Lin, 2013). In this process, the use of difficult words and complex sentence structure increases the risk of misunderstanding in communication and prevents the receiver from receiving the clear intended information. A clear and understandable language using is the first step in building successful signal content, and in this context, the simple and precise composition of the updating contents will act effective real-time strategy. Signal cost serves as the second component of efficacious signals (Connelly et al., 2011). Signal cost following costly signaling theory is remarkably central to the signaling theory (BliegeBird et al., 2005). It comes from the fact that some signalers are better at absorbing associated costs

while sending a signal to the receiver, that costly signal makes the receiver cognize signaler as a superior one. In the construction of a crowdfunding project description at the early idea stage, the preparation of sufficient image can be a signal for readiness in terms of signal cost, and this has led to successful campaign performance (Mollick, 2014). Similar effects might happen for real-time strategy during the campaign. In updating new information, the preparation of visualized materials not only shows the founder's readiness but also positive in terms of increasing the clarity of the contents. Potential investors can identify high-quality signalers who are genuinely confident in realizing their novelty when continuously sending out costly and clear signals (Ndofor & Levitas, 2004).

2.3 Contribution of the study

To summarize the review of literature, the entrepreneurial financing field of the study dealt with the role of capital providers and funding strategies appropriate for startup innovation. Research that interpreted crowdfunding as a new form of capital provider by expanding the research flow of established innovation capital providers such as venture capital was the mainstream development of the area. Studies have attempted to interpret entrepreneurial values and the nature of crowdfunding, which shifts the subject of investment decisions from a few experts to a large number of non-professionals. As one of the new forms of capital providers such as business angels and accelerators, its value and characteristics were explored in various ways as the initial fundraising tool of startups that strives for further innovational outcome.

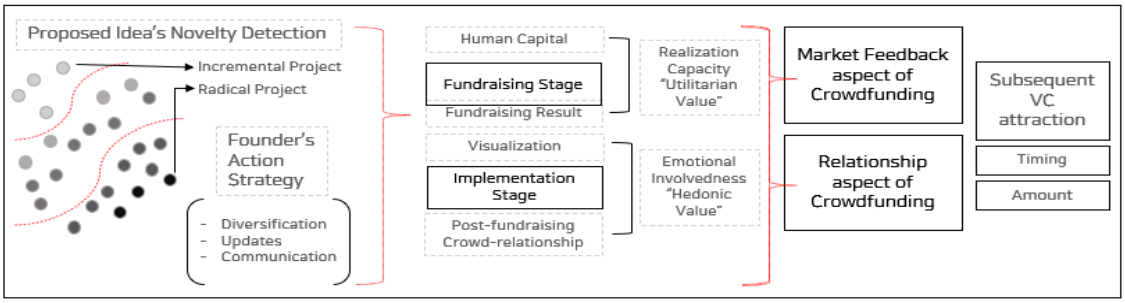


Figure2 *Three stage process of crowdfunded startup and linkage between studies*

Nevertheless, the review reveals the main issues with challenges that entrepreneurial understanding of crowdfunding encounters. In many cases, financing through reward-based crowdfunding is limited to temporary production funds. A number of crowdfunding studies discussed entrepreneurial values, lacking a practical understanding of the issue. Expanding the understanding of development processes at a later stage after crowdfunding and what makes a project's fundraising successful will provide a broader implication to this problem. The thesis approaches the crowdfunding research flow from this perspective. The study explores the process in the order of strategic understanding of novel idea persuasion, idea implementation and delivery after securing funds, and venture development in the subsequent stages. The next three studies explored the missing link of the existing study for each of these to help in-depth understand the essential entrepreneurial value of crowdfunding.

The first study describes the strategic behaviors that entrepreneurs should consider based on the novelty differences in project ideas. Although there exists plenty of prior research exploring the success determinants of crowdfunding, this study suggests more behavioral strategy elements that can be conducted during the fundraising period.

Furthermore, unlike the project factors that are determined in advance to the project proposal, it is suggested that the behavioral strategic effects can vary greatly depending on the degree of novelty of the project. In this study, we propose a method to metricize the ex-ante novelty of business ideas through natural language processing using deep-learning techniques that were not well utilized in the social science field. This expands the breadth of existing research on determinants for crowdfunding success by exploring fundraising success strategies that project entrepreneurs with various novel levels can take. In addition, future exploration of the innovation process can be boosted by the contribution of the methodology that can be widely used in the innovation study field.

The second study focuses on the satisfactory process of reward-based crowdfunding participants. This is to understand the motivation and satisfaction process of participants and to provide proper strategies to be considered for sustainable business development after crowdfunding to founders who consider crowdfunding as a capital provider. Existing crowdfunding research focused primarily on the success of fundraising itself, but there was also a minor exploration of follow-up satisfaction. Meanwhile, in customer research, there has been an accumulation of in-depth research on the satisfaction process and elements. In this study, the satisfaction process of a crowdfunding participant, who is an investor in the innovation process and a pre-purchaser at the same time, is interpreted by borrowing a framework of customer research. Through this, the understanding of the motives and behaviors of the crowdfunding participant is expanded, and the scope of the crowdfunding research arena is expanded to a wider psychological area.

Finally, the third study aims to examine the crowdfunded project factors that influence timing and valuation of follow-up venture funding and to explore the later process of growing into an innovative startup. According to the literature review, prior research on crowdfunding lacks on the exploration of the link between initial funding and subsequent capital provider such as venture capital. While discussing reward-based crowdfunding as a gateway to successful ventures, studies on the characteristics of subsequent development of crowdfunded companies have not been conducted due to data limitations. Therefore, the study overcomes data limitations and more actively interprets the entrepreneurial value of crowdfunding by exploring missing links.

Based on the aforementioned three studies, the goal of the thesis is to explore the process of developing novel ideas into innovative startups through reward-based crowdfunding and to provide entrepreneurs with practical strategy implications.

Chapter 3. Effective Strategies to Attract Crowdfunding Investment Based on the Novelty of Business Ideas

Abstract

Whether the novelty of an idea is a factor that directly influences crowdfunding success remains an area of ambiguity. We hypothesize that target funder diversification is effective with incremental ideas. However, focused business proposals are better suited to assert radical ideas. We also hypothesize the impact of two different strategic actions that founders can take during fundraising campaigns, agile information update and communication, on crowdfunding success. A deep-learning-based novelty detection model combined with statistical analysis is used to empirically test 7,406 crowdfunding projects crawled from online platform. Our results support our hypotheses and reveal that information updates from startup founders show non-linear quadratic relationships with fundraising performance, whereas two-sided communication helps stimulate investors. We also revealed that novelty level can influence strategic choice, indicating that a project with a higher novelty should have a focused target. Our finding suggests a solution to the conflicting conclusions in previous studies on the direct impact of novelty level and target diversification, by explaining the process of novelty-dependent behavioral strategies based on signaling theory.

Keywords: entrepreneurial finance, crowdfunding, investor attraction, deep learning, investor persuasion, startup success factor

3.1 Introduction

"A person with a new idea is a crank until the idea succeeds."

- Mark Twain

Entrepreneurship is fundamentally "concerned with novelty and value creation in the economy" (Stevenson, 1983), and creative ideas from new startups are critical sources of breakthrough innovations. However, not every new idea leads to successful innovation and it is challenging to accurately estimate the value of a novel business idea at the emergence stage (Winter, 2006). In traditional organization theory and strategy literatures, novelty generally refers to new technologies (Zollo & Winter, 2002) or a new approach (Van de Ven, 1993), but unlike creativity, it is not a concept that must involve positive outcomes (Makel & Plucker, 2014). In the literature on the effect of novelty of idea on investment attraction, which is the persuasion step in the innovation process (Perry-Smith & Mannucci, 2017), it appears that, similar to the conclusions of previous studies, novelty does not guarantee a positive outcome (Dutta & Folta, 2016).

Crowdfunding has recently been attracting attention as a funding method for early businesses (Mele et al., 2019). Studies have been conducted on the success factors of crowdfunding, (Bayus, 2013; Belleflamme et al., 2013), however, the impact of novelty was regarded as a controversial area (Horvát et al., 2018). It was due to the attention-grabbing nature and risk-embedding characteristics of the original idea (Chan & Parhankangas, 2017). For instance, in the context of crowdfunding, participants tend to be interested in novel projects and generally give high marks to creative attempts. However,

the more radical the idea, the lower the outsider's confidence in the feasibility of its realization (Gerber et al., 2012). This study argues that the direct effect of novelty does not explain this research gap, but the moderating characteristic of novelty makes a difference in fundraising strategy. To this end, we define three strategic actions that founders can perform when seeking crowdfunding. We argue that the scope for the founder setting the crowdfunding target should be different according to the novelty of the business idea. Another longstanding concern in this field of research has been whether target diversification is an effective strategy in the persuasiveness of ideas. We argue that the reason the studies on these two determinants, novelty and diversification, have been controversial is the tradeoff framework between the two. This study suggests that from nature of novel idea, focusing on signaling clear and reliable message is the key success factor for fundraising using theoretical framework from signaling theory. We investigate three action strategies that can be taken during the reward-based crowdfunding period: funding target diversification, updating project information, and communication. Furthermore, we assume that the effectiveness of the diversification strategy and project updates is not universal but depends on the degree of novelty of the project and explain it using signal and signaler-receiver perspectives.

For empirical analysis dealing with novelty, we propose a deep-learning-based text analysis methodology to proxy project novelty from the idea description. We investigate project proposals and strategic activities posted by founders and funders during the crowdfunding phase, using the web-crawled data of 7,406 unique projects. We also

conduct category-specific verifications for projects in the software field to identify categorical characteristics in order to explore in-depth phenomena. By resolving this relationship through a trade-off framework with a diversification strategy, we suggest that the focus for success in crowdfunding should be strategically shifted to recognition of the novelty of one's own project.

Our empirical results show that diversification of funding options is an effective persuasion strategy for incremental new ideas but can harm results for radical ideas. By suggesting that while the novelty of the idea does not directly affect the crowdfunding results, different strategic choices can produce positive results depending on the novelty, we can provide an alternative answer to the controversial issue of the existing research flow (Horvát et al., 2018; Chan & Parhankangas 2017; Xiao et al., 2017). In other words, it shows that the novelty level of the project idea is an important factor in determining how to target the scope of the target audience when making strategic choices for success in crowdfunding, and that it is a significant strategy to focus on the small audience in the realization of the radical novel idea. In addition, we present two different strategic actions that should be taken to fund a given idea in order to achieve more success in crowdfunding. First, we find that information updates during fundraising campaigns have a non-linear relationship with performance. We also explore the positive effects of two-sided communication on crowds during the campaign, which showed direct positive effects. Moreover, we tested positive moderation effect of novelty on this two-sided communication’s information asymmetry reducing effect and reliability-building effect.

Through this, it was shown that actively performing two-sided communication is positive for the success of the founder's crowdfunding and even more important in radical ideas, while it is important to find an appropriate level for updating the project.

The remainder of this paper is organized as follows. Section 2 presents a literature review and section 3 presents the theoretical framework and the hypotheses. Section 4 describes the methodology, section 5 presents the results, and section 6 carries forward the discussion of the results.

3.2 Literature Review

3.2.1 Crowdfunding as entrepreneurial financing and signaling theory

Literature dealing with the strategic process of successful investor attraction for financial resource acquisition has primarily developed based on signaling theory, a behavioral theory of information exchange when two parties have access to different information (Spence, 2002). It interprets the process of overcoming the asymmetry in information and persuading investors using signaling framework (Connelly et al., 2011), and entrepreneurship and management studies frequently apply the theory to help explain the strategic decision model. Examples among numerous studies include CEOs signaling unobservable qualities of the firm (Zhang & Wiersema, 2009) or manager characteristics (Certo, 2003; Lester et al., 2006) to potential investors, and prior investors signaling the next investor (Elitzur & Gavious 2003). For financial resource acquisition strategy, founders use signals such as press releases, showcasing, communication to potential

investors, for private (Busenitz et al., 2005; Daily et al., 2005; Michael, 2009) or public (Cohen & Dean, 2005; Jain et al., 2008) signal receivers. Startup companies publicize their business value, signaling their quality to potential investors in order to receive venture financing to drive further innovation (Rao et al, 1999; Zimmerman & Zeitz, 2002). This process happens rhetorically (Steigenberger & Wilhelm, 2018). Entrepreneurs use strategies that provide capable signals to get positive results from potential investors or customers. The crowdfunding literature also explores strategies for better fundraising results during crowdfunding campaigns (Ahlers et al., 2015; Belleflamme et al., 2014; Steigenberger & Wilhelm, 2018; Davies & Giovannetti, 2018; Song et al., 2019) using this theoretical background.

Crowdfunding has become popular as an early-stage funding method for the idea realization process. In crowdfunding, by definition, entrepreneurs directly attract large numbers of non-professional investors to fund their project ideas (Bayus, 2013; Belleflamme et al., 2014). Among crowdfunding types, reward-based crowdfunding has another distinctive feature, namely pre-purchasing (Frydrych et al., 2014). Reward-based crowdfunding is usually a product idea proposal with a tangible outcome; rewards are offered to initial funders who pay for implementation costs. Accordingly, in addition to the financial value of crowdfunding, various studies have dealt with non-financial benefits such as further signaling the market and expanding customer contact (Wehnert et al., 2019). To focus on the signaling of the idea realization process by testing the presentation of a single idea and its response, it is the most suitable form among other crowdfunding focused

on donations or corporate level investment. Research from the entrepreneur's perspective of the idea realization process mainly focuses on the incentives for choosing to crowdfund. Studies have also addressed the success determinants of fundraising at the individual project's investor-attraction level. Broadly, the determinants from research flows can be divided into project-related factors and founder-related factors. In studies dealing with project-related factors, project preparedness and updates (Mollick & Kuppuswamy, 2014; Mollick, 2014), project duration settings (Burtch et al., 2013), project description (Mollick, 2014), and reward quality and price (Hardy, 2013; Hu et al., 2015) were emphasized. Crowdfunding studies on founder-related factors dealt with human capital, such as education and experience (Ahlers et al., 2015); social capital, such as number of Facebook contacts and links on online platforms (Mollick, 2014); and geographical characteristics (Agrawal et al., 2014; Agrawal et al., 2015).

3.2.2 Novelty of an idea and crowdfunding success

Which novel ideas lead to successful innovation, and how, has long been a concern for both researchers and practitioners. A good representation of the intermediate process can be organized into a four-stage idea journey framework: idea generation (Burt, 2004), idea elaboration (Hargadon & Bechky, 2006; Mainemelis, 2010), idea championing, and idea implementation (Ahuja, 2000). During the idea generation stage, a variety of ideas with potential usefulness are produced. The elaboration stage is when ideas are selected to go through the implementation process. The idea championing stage (Perry-Smith &

Mannucci, 2017) includes a fundraising process to attract investors. Entrepreneurs who propose fresh ideas at the beginning of the innovation process highly value their own ideas. However, not everyone else to whom the idea is presented has the same opinion. Therefore, entrepreneurs must convince potential investors, markets, and customers that their novel business idea will lead to successful outcomes. Consequently, the investor persuasion stage is the gateway to successful innovation (Horvát et al., 2018). The effect of novelty of idea on the idea persuasion stage, that is, on successfully signaling the value of the idea to early crowdfunders, has been discussed (Horvát et al., 2018), but emphasizing positive effects due to survival-enhancing capabilities of originality (Hyytinen et al., 2015) and counter arguments and examples that highlight uncertainties (Chan & Parhankangas, 2017) coexist. Original ideas are not only something new, but also surprising, uncommon, or unexpected. This aspect surprises potential funders and competitive differentiation impacts startups such that they can find funds easily (Hyytinen et al., 2015; Jennings et al., 2009). Novelty, however, increases uncertainty for potential financiers, which often makes funding decisions more challenging (Hyytinen et al., 2015; Cunningham, 2017). Owing to these conflicting forces, the value of novelty in entrepreneurship has been debated for decades. The same happens in the process of crowdfunding, which is seeking for a new initial fund and corresponds to the idea persuasion stage.

Studies attempting to uncover its effect on the success of ventures rely on observational, experimental, and survey data on other forms of crowdfunding that introduce investigations of novelty in relation to fundraising success but do not reach

consistent conclusions. It is apparent, therefore, that a significant gap exists in the research.

3.2.3 Measuring novelty and innovation performance

Conceptualizations of novelty and creative ideas have been around for a long time. The most apparent classic definition is to see creativity as the generation or production of ideas that are both novel and useful (Amabile, 1983). For an idea to be creative, it must be not only be novel but consequently useful. Although the definition of novelty is mixed in various ways, the definition of novelty that follows in this study is the most widely accepted: something being unique or rare. However, an idea's novelty does not necessarily lead to valuable and successful results, which means that the novelty we adopt here itself indicates value-neutral heterogeneity (Amabile,1983; Brigandt & Love, 2012), different from creativity. This uniqueness is an essential driver of new business opportunities for an entrepreneur, and innovation comes from successfully implementing a novel idea (Oldham & Cummings, 1996). However, in the idea-generation phase of innovation, where the subsequent results are unknown, the audience's opinions on the novel idea may vary (Mueller et al., 2012). Novelty is thus an ex-ante concept.

It is, therefore, worthwhile to proactively measure the novelty of an idea to theoretically understand the entrepreneurial process. While such attempts have been limited for empirical studies in the field of social science, in computer and information science, methods for novelty analysis have been widely developed over decades. For instance, computer scientists have made intensive attempts to measure the novelty of text

through natural language processing (NLP). Novelty detection in idea description documents entails identifying novel ideas that differ in some respect from those in already existing projects. Early approaches to capture the novelty level of a new document involved classification-level detection and searching for novel recombination of knowledge elements (Franzoni, 2010; Uzzi et al., 2013). The field moved beyond measuring document novelty from metadata with the gradual introduction of NLP for various applications. Topic detection and tracking or new story detection have been applied in novelty mining research using recent NLP methodology and machine learning techniques. Zhang et al. (2002) defined novelty as a direct opposite characteristic to redundancy and proposed five redundancy measures to quantify it. Most techniques involve first grouping existing documents into clusters and then checking whether a newly generated document can be included in an existing group based on a preset similarity threshold (Allan et al., 2000). As computer science has primarily dealt with the distinguishing performance of models with labeled datasets, highly developed labeled datasets, such as the Associated Press Wall Street Journal (APWSJ), have been used to verify the novelty-detecting performance (Tsai & Zhang, 2011).

Recently, radical improvements have been made in NLP due to the application of deep-learning techniques, which are being actively utilized for both constructing embedding from text data and predicting novelty level from embedded data.

Tsai & Zhang (2011) applied a document-to-sentence framework to calculate the novelty of each sentence and aggregated them to measure the novelty of the entire

document. Karkali et al. (2013) implemented a similar novelty score using an inverse document frequency-scoring function. Other methods have attempted to measure novelty in various ways such as the information entropy measure to calculate the innovativeness of a document (Dasgupta & Dey, 2016), Google's Word2Vec model to enhance topic keywords with more complete semantic information (Hu et al., 2019), a system for finding analogies between research papers (Chan et al., 2018), analyzing development trends to detect novelty in writing style (Pohl & Mottelson, 2019), the multilingual sentence categorization approach (Mele et al., 2019), and measuring novelty by calculating the degree of difference.

Researchers in other areas have dealt with document novelty for applications, such as identifying breakthrough scientific papers, (Savov et al., 2020), novel embedded trend detection (Jiang et al., 2018), and predicting long-term scientific impact of research papers (Yan et al., 2012). These methods have not been actively adopted in the field of management but can be introduced for a deeper understanding of innovation in the entrepreneurship research field.

3.3 Theoretical framework and hypotheses development

Many reward-based crowdfunding projects might not be with high-level novel idea, but there also exist marketing-based campaigns, such as manufacturing and selling existing products or products with minimal variations. However, this aspect of online crowdfunding is not a drawback that must be screened out, as it offers more potential data value and

research possibilities. Investigating how ideas with different levels of innovativeness emerge into a successful fundraising outcome can complement missing links in research on the startup process.

However, solely testing the direct performance effects of heterogeneity levels has fewer practical implications for entrepreneurs. Even though some projects with high novelty achieved outstanding project success, it might be a bad idea to construct a project that is unconditionally heterogeneous from existing ones. Instead, the theoretical and practical managerial interest lies in how the strategy for successful fundraising needs to change depending on a project idea's heterogeneity. Therefore, we divide the action strategies that can be adopted during a crowdfunding campaign into three categories: target diversification, updates, and communication. Then, we consider whether an effective fundraising strategy can vary depending on the business idea's novelty level when introducing ideas to the crowd.

3.3.1 Idea's novelty

Novelty and innovation research flows vary at the individual, social, organizational, and corporate levels. Studies on the impact of the novelty of ideas have used several different terminologies depending on the field, such as the creativity level (Madjar et al., 2011), innovativeness (Bower & Christensen, 1996), newness degree (Callahan & Lasry, 2004), and level of novelty (Koc & Bozdag, 2017). In the innovation field, researchers have considered the impact of innovativeness on social change, or the impact of knowledge

novelty leading to performance. Novelty is the essential beginning stage of innovation, but most studies conclude that extremely high novelty does not lead to successful outcomes. Startup research on consumer perspectives also focuses on how positively consumers perceive newness, and finds differences based on the degree of innovativeness (Talke & Heidenreich, 2014). The overall conclusion is that appropriate and moderate novelty is of interest, but markets reject excessive heterogeneity.

Meanwhile, the dependence of reward-based crowdfunding success on novelty perception has not been covered well in the literature. Researchers have found through surveys that crowdfunding participants are innovation-oriented and tend to pursue and participate in innovation processes (Gerber et al., 2012). Crowdfunding research deals with motivations for investment and the search for new products that are difficult to purchase in the ready-made market (Bretschneider et al., 2014; Bagheri et al., 2019). Crowdfunding participants' craving for newness and curiosity is higher than that of the average customers in the market. The novelty of business ideas raises fresh curiosity for potential funders, which can be a positive signal for fundraising performance.

Reward-based crowdfunding participants have two-sided characteristics, as investor and pre-purchaser. Crowd participants are primarily non-professional investment decision makers who make more emotional and improvised investment decisions. Their non-professional decision-making could largely be due to receiving instantaneous stimuli, perceiving interesting elements, and killing/rejecting certain parts of proposed ideas. In this regard, the overall heterogeneity of a proposed idea can serve as a positive stimulus

for selection among numerous project candidates. The evaluation of individual ideas may vary from investor to investor, but what is vital in crowdfunding success is not a high average overall rating. Instead, if enough funders evaluate the project well enough to invest their own money, the crowdfunding project will succeed in raising enough funds to proceed with the idea realization process.

However, excessively high heterogeneity leads to a sense of rejection ahead of fresh recognition (Chan & Parhankangas, 2017). People cheer for creative changes in their areas of familiarity, but totally unfamiliar heterogeneity induces an uncomfortable feeling and seem less credible. When a potential customer sees something new, the reactions of curiosity and rejection coexist in cognitive terms (Berlyne & Parham, 1968). The likelihood of curiosity and rejection depends on the individual's knowledge, experience, and judgment. Therefore, the fact that the project itself differs from existing ones does not directly determine its popular acceptance. An idea's novelty can affect the behavior of the crowds evaluating a project; however, it is difficult to assert that it directly affects the crowd's investment decisions. Therefore, we propose the following hypotheses:

H1: The novelty level of project ideas has no direct relationship with crowdfunding success.

3.3.2 Target diversification and an idea's novelty

One of the strategies that can be utilized by crowdfunding project founders is the degree of target diversification while proposing the idea. On online crowdfunding

platforms, it can be done by presenting a variety of options for funders to choose from when they provide capital (Bretschneider & Leimeister, 2017). It is possible to select a strategy that appeals to a wide range of target funders by separately presenting various price ranges and desired reward types. Providing a variety of pledge objectives can satisfy a wide range of consumers. However, when presenting a new business idea, diversifying target funders in the idea description can appear to be a double-edged sword. The number of options plays an important role in influencing backers' funding decisions (Du et al., 2019). A founder's goal in online reward-based crowdfunding is not to get a high score from everyone, but to get satisfaction from enough funders (Mollick, 2014). Success in crowdfunding means attracting sufficient funds from enough funders to satisfy the project fundraising goal. Research dealing with the effects of giving a diverse number of selectable options is mainly based on theoretical backgrounds from assortment decision research (Oppewal et al., 2005). More options can lead funders to find a close match to their needs and desire (Bélanger et al., 2015). Others explain the positive effect of more options as a versioning and price discrimination effect (Kunz et al., 2017). Moreover, reducing effort and time in searching one's preferred alternatives creates cognitive incentives to choose projects (Laporte & Laurent, 2014).

H2: Target diversification strategies have a positive relationship with crowdfunding success.

Concentrating on detail will deliver quality signal to potential funders wich high level of satisfaction and advance decision-making to someone who has specific needs.

Meanwhile, the pursuit of excessive diversification has its drawbacks. First, the focus of the business can be blurred. Many proposed ideas compete in crowdfunding platforms and excessive diversification can interfere with the clear delivery of project messages (Lukkarinen et al., 2016). If it contains too much content, the message becomes rather vague, and the information asymmetries between founders and funders can be made even more.

This tendency can vary depending on the funders' perceived risk of the project. Crowdfunding participants place value on the process of realizing a novel idea. If the novelty level of the idea is high, it can attract the attention of those in search of novelty, but at the same time, it raises the question of feasibility (Chan & Parhankangas, 2017). From a signaling point of view, the information asymmetry that founders need to care about is greater and the issue of trust becomes more important in novel idea. When ideas are radically new, the public's assessment of the value is diversified, information asymmetries are bigger and legitimacy issue becomes more critical. Thus, as an idea become more radically novel, business ideas must be concise and clear, and founders should pay more attention to establishing reliability while signaling quality. More options can increase cognitive costs and lowers reliability (Chernev, 2006), thus resulting in hesitation on part of the decision-making funders. Excessive information is disadvantageous for the acceptance of a new product since it can hinder backers' decision-making (Li, 2016). In other words, a diversification strategy can result in losses due to decentralization as well as a loss of trust that can outweigh the effects of gaining newcomers' interests and

preferences. Moreover, since funders value a sense of participation and belonging to the creative process, focused product design and value proposition can maximize this emotional value.

In contrast, if the business idea's novelty is low, the founder's strategy should be to show differentiation from similar projects. Reward diversification can be used as part of this strategy (Oppewal et al., 2005). When the public decides to respond to a familiar proposal and pre-purchase, the perception of risk is low. In this case, it is important to win the competition of ideas between similar projects by taking advantage of marketing benefits from the economy of scope. Diversified options on a project can make for a better price discrimination effect (Kunz et al., 2017), and better targeting of funders' specific needs (Bélanger et al., 2015).

Therefore, we conclude that depending on the nature of the idea, the effectiveness of a strategy can vary. We argue that the crowdfunding performance impact from diversification varies depending on the perceived novelty level and propose the following hypothesis.

H3: The novelty level of a project idea moderates the relationship between diversification and crowdfunding success.

3.3.3 Information updates and two-sided communication

Other strategic actions during the fundraising period are information updates through update posts and two-sided communication through comments on crowdfunding platform.

Both these actions are intended to draw as much funding as possible through strategic signaling.

The presentation of new ideas inevitably has information asymmetries and reliability issues between the founder and the public. From a signaling theory point of view, founders use continuous updates as an effort to close this information gap and gain interest from the public. Founders update project information during the campaign as a strategic action, and research on information updates during crowdfunding has explained it as a positive behavioral strategy to draw attention, inform progress, and make changes in the funding process (Block et al., 2018). The appearance of continuous project management can give a favorable signal in terms of reliability. However, it was shown that the effect is different depending on the purpose of the updated post (Xu et al., 2014), or on frequency and timing (Block et al., 2018). Because, on the other hand, too much change signals rather low reliability at idea selection stage. Since our main interest is to explore the action strategy during the fundraising period, we focused on the impact of updates related to project changes and feedback acceptance, excluding promotional pep talk, which previous studies have shown to have no significance.

Ideas develop through the elaboration stage. The ideas presented by the founder can be transformed to suit the needs of the funders based on their feedback, thereby increasing the attractiveness of the project and helping to move toward its completion (Block et al., 2018). Being flexible about transforming and having evolving ideas in response to market feedback or in response to environmental changes are beneficial for improving viability.

Crowdfunding participants can feel the emotional satisfaction of participating in the innovation process when they feel that their opinions are reflected and listened to during project development. Besides, continuously adding appropriate information can be effective in attracting a wider range of customers. This situation contributes to a project being viewed as active and is effective in attracting new attention (Kuppuswamy & Bayus, 2017; Mollick, 2014). On the other hand, Excessive fluctuations may appear to show a low level of professionalism and experience in dealing with the project and will lower confidence in the idea. Agile updates are a double-edged sword as a strategy to increase the acceptability of new ideas. To receive a positive evaluation and increase the decision confidence of crowds who participate in the project, founders must execute their project plan consistently (Block et al., 2014).

Overall, it is an effective strategy to carry out continuous updates of ideas reflecting funder feedback or updating progress information, but if excessive amounts are used or the frequency is too high, the effect can be diminishing, thus making it rather negative.

H4: Updates in projects having a non-linear relationship with crowdfunding success.

Crowdfunding project founders strategically use comment sections for two-sided communications with crowdfunding participants. Founders are insiders who have more information about the project idea and its actual progress. Based on this informational advantage, they can make better judgments about the value of their novelty and the feasibility of idea realization (Gerber et al., 2012; Mollick, 2014). Crowds are outsiders who lack information about the project, compared to the founders, but this information

asymmetry can be reduced when receiving signals from founders (Ahlers et al., 2015). Therefore, founders try to signal their quality to potential capital-providers to establish legitimacy and build credibility (Rao et al., 2018). Research on signaling theory have stressed the importance of this investor trust–distrust mechanism (Strohmaier et al., 2019) while approaching situation with information asymmetries. Project contents on an online platform are not always verified, and the crowds are also responsible for verifying it. Participants use communication to resolve what they doubt and what information they feel is insufficient. A founder's timely responses to inquiries allow for the effective delivery of information.

In addition, communication activities can be viewed as friendship promotion activities to increase the effectiveness of signals. Signal honesty (Durcikova & Gray, 2009) and veracity (Busenitz et al., 2005) both emphasize the signaler's integrity. The most fundamental element of building credibility is intimacy. The relationship between potential investors and the founder is often considered a critical factor of a successful valuation in the stream of entrepreneurial funding studies (Kollmann & Kuckertz, 2010; Van Rijnsoever et al., 2017). For example, establishing personal relationships with angel investors or venture capitalists (Sapienza & Korsgaard, 1996) reduces information asymmetries and places more reliance on the founder's words. This tendency also occurs in the crowdfunding case; entrepreneurs make strategic efforts to build relationships, most notably communications activity with funders on the online platform. Some have understood the mechanism of crowdfunding from a social exchange theory (Zhao et al.,

2017).

Furthermore, active communication has a positive effect on the other's logic. In terms of signals, an individual who is unsure about how to interpret a signal may look to imitate others' interpretation (Sliwka, 2007), also described as "bandwagon effects" (Henderson & Cool, 2003). This behavior further promotes a sense of belonging, by boosting the intention to participate in the innovation process through indirect communication with others. Therefore, we propose the following hypothesis:

H5: Two-sided communication about projects has a positive relationship with crowdfunding success.

The higher the novelty of a project, the higher its information asymmetries and less credibility on the idea is held between founder and funders. Accordingly, the effect of gaining trust and bridging the information gap becomes more important for high novelty ideas.

For ideas with a high novelty level, a more complex situation occurs in the effect of project updating. Transmission of sophisticated information in a situation where understanding and trust for new ideas is low may have a positive effect on such a large information gap, but excessive fluctuations and excessive provision of new information cause confusion, even lowering understanding and trustworthiness. From the signaling theory point of view, the negative signal on trust and the view of resolving the information gap conflict. Therefore, it is difficult to assume that the influence between project updating and crowdfunding success is significantly affected in one consistent direction according to

the novelty level.

On the other hand, in the case of two-sided communication, there could be a significant difference according to the novelty level. Direct one-to-one communication with users can reduce information asymmetries and at the same time acquire credibility from intimacy. In addition, as communication from other crowds is exposed, trust from the community also acts as an additional positive signal. Therefore, the higher the novelty level, the stronger the positive signaling effect of this two-sided communication.

H6: The novelty level of a project idea moderates the relationship between two-sided communication and crowdfunding success.

The figure below shows the research model synthesizing the hypotheses of this study. From the hypotheses described above, three different types of strategic actions affect the success of crowdfunding (H2, H4, and H5). However, an idea's novelty has a moderating effect (H3 and H6) on the relationship H2 and H5 respectively, while it does not have any direct relationship with fundraising success (H1).

Figure 1 demonstrates our research model.

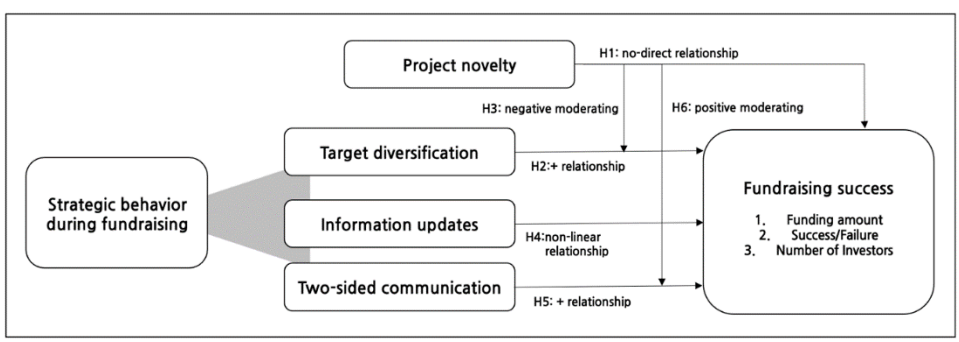


Figure 1 *Research model*

3.3.4 Method

We used web crawled project data as data for testing hypotheses in this study. As a test method, OLS was used with reference to the method of previous related studies, and tobit, logit, and negative binomial model tests were additionally performed for each dependent for robustness test. In addition, a deep-learning method was adopted through natural language processing as a method to proxy novelty levels among individual variables.

3.3.4.1 Data sources

Our empirical analyses used original web-crawled data from an online reward-based crowdfunding platform, Kickstarter. Since its launch in April 2009, it has been used for examples and data in several entrepreneurship studies and has become a representative platform in previous studies (e.g., Kuppuswamy & Bayus, 2017; Mollick, 2014). Furthermore, some projects funded through the platform attracted further entrepreneurial funding and led to innovative startups. We crawled projects from 2009 to 2019, obtaining 11 years of data. In our analysis methodology, we used NLP on the idea description text, such that only campaigns posted in English were considered potential targets. Furthermore, to focus on the innovation process of ideas, only technology categorized projects accompanied by product delivery were selected. This was to focus on idea implementing crowdfunding cases, as there were lots of simple charity fundraisers due to the nature of

Kickstarter in most other categories. Therefore, we tried to rule out cases without an idea implementation process by focusing on tech-categorized projects, we then excluded projects that were considered pranks, which had pledges of less than $100. To focus on strategic actions during the fundraising campaign, final data was limited to projects for which we could access data about information updates and communication activities during the campaign. Our final dataset consisted of 7,406 independent implementation projects, with 42,165 intermediate updates and 199,925 comments data. Sub-samples were divided according to pre-selected sub-class categories for in-depth category analysis. The scope of the collected data includes the overall meta-data, descriptive documents, images, videos, creator descriptions, reward settings, delivery information, comments, and any updates made during the campaign.

3.3.4.2 Descriptive statistics

Table 1 shows the descriptive statistics of our sample. We observed 4,772 successful campaigns; 64.4% of total projects met the fundraising goal. There were more than 4 million cumulative funding decisions across campaigns. Funding amounts were concentrated in a few extremely successful projects rather than being evenly distributed across the board. Therefore, we used the natural logarithmic term of pledged amount as dependent variables to correct this distribution status problem. The average number of information updates was 5.6 times throughout the campaign. It was slightly more frequent than the average of every 25 days reported by an in-depth study of mid-way updates of

existing equity crowdfunding (Block et al., 2014). No correlation problem was found in the correlation test conducted to check the collinearity problem between variables prior to model validation. The variance inflation factor (VIF) test for possible multicollinearity problems showed a mean value of 1.25.

Table 1 Descriptive statistics

Variable	Mean	Median	Std. dev.	25% Per.	75% Per.	Min	Max	N Obs.
lnPledged	9.2093	9.3509	2.2206	7.7946	10.8230	3.0445	15.6441	7406
Novelty	0	0.1274	1	-0.1496	0.4388	-3.7851	3.1050	7406
Updates	5.6934	5	4.6903	2	8	0	30	7406
Diversification	9.3505	9	4.7328	6	12	1	30	7406
Comments	26.9951	5	64.9662	1	24	0	1717	7406
Complexity	0	0.3253	1	-0.4308	0.6868	-3.5157	1.6068	7406
Duration	101.862	64.515	127.402	44.324	103.454	5.023	695.508	7406
Description	1.43e+9	1.42e+9	5.59e+7	1.39e+9	1.46e+9	1.24e+9	1.54e+9	7406
Human Capital	1.3098	0	3.2134	0	2	0	39	7406
Social Capital	6.9640	1	21.2127	0	6	0	778	7406
Visuals	12.4234	8	14.3977	2	18	0	126	7406
Year	2014.594	2015	1.7728	2014	2016	2011	2018	7406

3.3.4.3 Dependent and explanatory variables

The empirical model of this study uses the degree of funds secured through a crowdfunding campaign as the dependent variable, lnPledged, and three different variables—Diversification (H2, H3), Updates (H4), and Comments (H5)—as explanatory variables. Novelty (H1) of an idea is used as a moderating variable that affects the influence of explanatory variables.

The dependent variable lnPledged is used to measure the successful degree of crowdfunding. We used a log of campaign pledged US$ amounts for the dependent variables. Our first explanatory variable, Diversification, is the number of pledge models

proposed by the founder when posting the project. It is how the founder diversified possible opportunities for the sponsorship of business ideas. The second explanatory variable, Updates, is a count of total changes posted for informational updates during the fundraising campaign. It is limited to the cases in where changes in contents of the project items are included in the updating text. Our third explanatory variable, Comments, is the number of comments made during the fundraising period by the founder and funders to proxy activeness of two-sided communication activity.

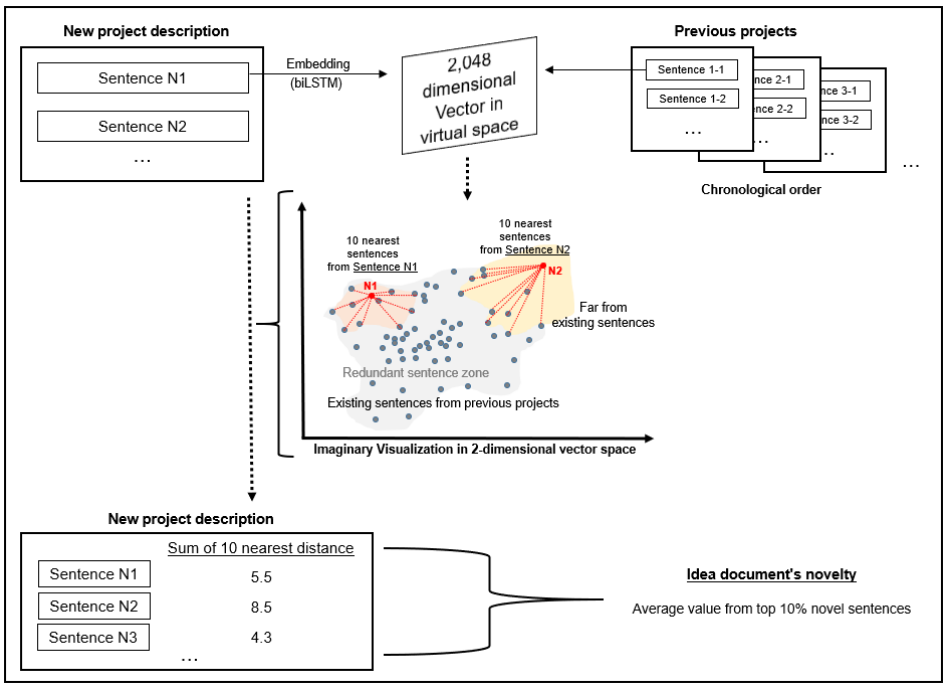


Figure 2 *Proxy method using sentence embedding with deep-learning model*

Our moderating variable, Novelty, is a continuous variable that indicates how differentiated the project is from existing known crowd fundraising projects. It is a proxy value obtained through the deep-learning-based NLP and classification procedure. We first constructed an embedding of all sentences contained in project description documents

using the Infersent (Conneau et al., 2017) model. Infersent is an embedding methodology using supervised learning with a biLSTM model trained with the Stanford Natural Language Inference labeled dataset (Bowman et al., 2016). It is a model known to have performed well in coordinating human cognitive meaning in multiple sample tests in prior studies. After the embedding process was done, each project description went into a group of vector values that indicated the semantic meaning of sentences in the virtual meaning space. Each project idea was converted as the sum of the sentence vectors embedded in the meaning vector space of 2,048 dimensions.

Then, for each sentence in the focal project description, sentence vectors were compared with existing embedding values of earlier projects. The nearest 10 vectors from existing projects were obtained for each sentence, and the distance between them and the focal sentences were measured as the semantic heterogeneity of the sentence. Finally, we proxied the project idea's overall novelty level by averaging the top 10% sentence heterogeneity scores from the full idea description document. This procedure was done to all projects crawled from Kickstarter; a semantic comparison of the focal project and the project that preceded it was performed in chronological order. Since numeric values for distance in virtual embedding vector space have no meaning by themselves, the measurement values of the entire project were standardized. Figure 2 above shows our measurement method for Novelty in highlights (H1 and H3).

3.3.4.4 Control variables

Following previous research, we included the number of control variables in our

research model. Complexity measures the average language complexity of the idea description. We calculated the Flesch Readability Index rating (Flesch, 1948) as a proxy for the founder's language usage complexity which can interfere with clarity. Flesch Readability Index is calculated following the equation below.

Flesch Readability Index =

$$206.835 - 1.015\frac{total\ words}{total\ sentences} - 84.6\frac{total\ syllables}{tatal\ words}$$

Duration is the total number of fundraising days set by the founder. Previous studies have shown that long periods are not necessarily favorable to crowdfunding success (Wheat et al., 2013). Description is the total number of words in the idea description document. In general, detailed information showed a positive effect on crowdfunding success in previous research (Mollick, 2014). Word count was calculated using the Python NLTK package. Two aspects of capability that can affect the success of crowdfunding were included as control variables. For an index to proxy the Human Capital capability of the founder, the number of fundraising experiences a project founder has had in the past was used, as in previous studies (Ahlers, 2015; Piva & Rossi-Lamastra, 2018). Existing crowdfunding studies have used the platform's sponsorship experience and Facebook friends as a proxy for the founder's social capital capabilities (Butticè et al., 2017; Colombo et al., 2015; Lukkarinen et al., 2016). For Social Capital, we counted funding activities that the founder has participated in for other projects. A widely used variable to explain crowdfunding success through cost signals is the number of images included in the project description (Crosetto & Regner, 2014); hence, we included Visuals. We also

included dummy variables for Year and Category in the model.

3.3.4.5 Empirical model

First, with reference to prior studies dealing with crowdfunding success, scatter patterns and variances of the dataset were tested to determine a suitable analytical model. Initial analysis was conducted based on ordinary least squares (OLS), and model reliability and distribution were verified. First, the correlation test result between the variables did not show a critical issue of value over 0.6, and the VIF test result with a mean value of 1.25 did not find a multicollinearity factor that would impair model reliability. In addition, to verify the residual pattern in the OLS model, a Breusch-Pagan test was performed. Test results showed no heteroscedasticity problems, with a chi-squared value of 0.23 (Prob> chi2 = 0.6346). Thus, it was concluded that the BLUE condition was not violated with in the form of taking a dependent log value for. We concluded that the OLS model is reliable for verifying our hypotheses. We took the natural logarithm term for the dependent variable; then, we standardized the control variables to increase model reliability. The model equation we used for the test is as follows:

$$\begin{aligned}\ln\text{Pledged} = {} & \beta_0 + \beta_1 * \boldsymbol{Novelty} + \beta_2 * \boldsymbol{Diversification} + \beta_3 * \boldsymbol{Diversification} \\ & * \boldsymbol{Novelty} + \beta_{41} * \boldsymbol{Updates} + \beta_{42} \\ & * \boldsymbol{Updates^2} + \beta_5 * \boldsymbol{Comments} \\ & + \beta_6 * \boldsymbol{Comments} * \boldsymbol{Novelty} + \boldsymbol{u}, \qquad (\mathbf{1})\end{aligned}$$

where the left side represents the dependent log variable of the pledged amount to measure the project success level. β_0 stands for the constant term while other beta terms

indicate the coefficient values of each explanatory variable. To investigate the correlation of Novelty, the single term included in the model 1 (for H1), additionally included the square term (non-linearity) was tested in model 2. We conducted additional tests on software-related projects to examine in-depth characteristics within specific categories.

By conservatively measuring idea novelty continuously, the moderating effect of novelty was verified by dividing projects into three separate groups, as a robustness test. We divided a total of 7,406 sample projects into three groups based on idea novelty. Those in the top 25% percentile were placed into the Novel group. The bottom 25% of the novelty valued projects were placed into the Redundant group. Other projects not included in the above two groups were classified into the Middle group. The regression model with the group dummy variable of each group and multiplication terms to explain the moderation effect is shown below (2)

$$\text{lnPledged} = \beta_0 + \beta_2 * \boldsymbol{Diversification} + \beta_{41} * \boldsymbol{Updates} + \beta_{42} * \boldsymbol{Updates^2} + \beta_5 * \boldsymbol{Comments} + \boldsymbol{Group\ Dummy} + \boldsymbol{u} \quad (\mathbf{2})$$

We tested the null hypothesis H_o below to show all three groups have a significantly different coefficient for diversification strategy when fitting into the base model.

$$H_o: \boldsymbol{Novel\ group's}\ \beta_2 = \boldsymbol{Middle\ group's}\ \beta_2 = \boldsymbol{Redundant\ group's}\ \beta_2$$

To compare three regression coefficients, the model returned two predictors due to one omitted group. We conducted an F-test on these values to achieve our testing purpose.

To verify our hypotheses' robustness, we conducted extra tests. First, we conducted three robustness test regressions with changing dependent variables indicating project success. In the multi-model robustness check, the dependent variable with fundraising

amount (Tobit model; Piva & Rossi-Lamastra, 2018), whether the goal was met or not (Logit model; Colombo et al., 2015), and number of total investors attracted (negative binomial model; Ahlers et al., 2015) were included. Second, to test robustness of the deep-learning-based novelty detection model, we adopted an alternative proxy method using keyword analysis on the idea description, as described in the next section.

3.3.5 Results

Table 2 shows the regression results of our analysis. The first column, "Baseline" is a linear model containing only control variables referring to the prior research flow of success factors of crowdfunding. Most control variables showed significant p-value and direction following prior results. H1 is an exploration of whether novelty levels have a positive relationship with fundraising performance. When only novelty was added to the baseline including all categories, statistically insignificant results were obtained, but these were insufficient to adopt H1. As a result of plotting the distribution, we concluded that despite the category dummy, the influence of novelty may differ among groups. In the in-depth test, we confirmed that special characteristics appeared in the projects classified as software-related. For this classification, we tested the same model using only project samples whose mid-class categories was set as software on the online platform data.

Table 3 shows the regression results using the same research model limited to software-related projects. The novelty's direct relationship was analyzed across Full Model and Model 10. The results showed that the direct effect was positively significant (β_1=-0.350, $p < 0.05$) in the full model, supporting H1a. Figure 4 shows the plotted result. The

solid black line represents the linear positive relationship, and the gray dotted line is the fitted line to test the possibility of a non-linear quadratic relationship. Like Table 3, the results show that the fitting is close to linear, and that it is suitable for viewing with a linear positive correlation between novelty in software projects and fundraising success.

Models 1 and 2 in Table 2 are used to test the relationship between project success and diversification, and the moderation effect of novelty on that relationship. In Model 2, with Diversification as a single term, the β_2 value was 0.1380 ($p<0.01$), supporting H2. In Model 2, which adds the Diversification and Novelty multiplication terms, the β_2 value was almost as it was at 0.136 ($p <0.01$) and the β_3 value was -0.0178 ($p <0.01$), supporting novelty's negatively moderating effect (H3). Both models had significant F statistics and sufficient adjusted R-squared value (0.3758) increases, so the result was considered to have explanatory power and reliability. Tests in two different categories of software and gadgets have shown that this trend remains the same. The results in software projects (Table 3) also showed different magnitudes and the same direction and significance. However, the difference in the impact of Diversification according to Novelty was more intense in the software category. In the low-level novelty, it was not much different from the general result, but in the group classified as high-level novelty, the effect of the diversification on the project success turned out to be negative. Figure 4 visualizes the difference in the marginal effect of diversification depending on the novelty level.

Models 3 and 4 in Table 2 are used to test the relationship between project success and updating actions. In Model 3, which contains only Updates as a single term, the β_{41}

value was 0.168 ($p < 0.01$). In Model 4, which adds the Updates Squared term, the β_{42} value was -0.0101 ($p < 0.01$), supporting the non-linear quadratic relationship assumption of H4. Throughout the two regressions, significant F statistics and sufficient adjusted R-squared value (0.3824) increases were shown, so the result was considered to have explanatory power and reliability. Figure 5 shows the results confirming the relationship.

Model 5 in Table 2 includes the strategic behavior variables of comments. H5 was supported by positive significant coefficient β_5 (0.0105, $p < 0.01$). The entire model was significant in F-statistics. The last column in Table 2 shows our full model, including all explanatory variables and controls at once including model for testing moderation effect of Novelty on the relationship between project success and comments (H6). The result showed the same conclusions and significance as the previous individual additive models. Hypotheses were supported, and the explanatory power and significance of the model were also significant in the full model. As a result, the individual verifications did not contradict each other and thus supported our arguments.

Table 2 Results for testing with whole tech-related projects

	(1) Baseline	(2) Model 1	(3) Model 2	(4) Model 3	(5) Model 4	(6) Model 5	(7) Full Model
Explanatory							
Novelty			0.0662				0.0919**
			(0.0462)				(0.0403)
Diversification		0.138***	0.136***				0.0846***
		(0.00457)	(0.00457)				(0.00409)
Novelty* Diversification			-0.0178***				-0.0151***
			(0.00436)				(0.00380)
Updates				0.168***	0.367***		0.258***
				(0.00445)	(0.0106)		(0.0106)
Updates Squared					-0.0101***		-0.00837***
					(0.000490)		(0.000497)
Comments						0.0105***	0.0135***
						(0.000325)	(0.000431)
Novelty* Comments							0.00141**
							(0.000443)
Control							
Complexity	-0.0930***	-0.0975***	-0.0942***	-0.0465**	-0.0201	-0.0898***	-0.0778***
	(0.0218)	(0.0206)	(0.0205)	(0.0200)	(0.0195)	(0.0204)	(0.0178)
Duration	6.63e-09***	4.61e-09**	4.46e-09**	5.21e-09***	4.74e-09***	6.29e-09***	5.45e-09**
	(2.03e-09)	(1.91e-09)	(1.91e-09)	(1.86e-09)	(1.80e-09)	(1.90e-09)	(1.61e-09)
Description	0.000184***	5.66e-05	0.000125***	5.30e-05	5.43e-05*	0.000190***	7.09e-05*
	(3.66e-05)	(3.47e-05)	(3.75e-05)	(3.36e-05)	(3.27e-05)	(3.42e-05)	(3.25e-05)
Human Capital	-0.00611	0.00136	0.00143	-0.00903	-0.0106*	-0.00617	-0.00601
	(0.00723)	(0.00683)	(0.00681)	(0.00662)	(0.00644)	(0.00677)	(0.00556)
Social Capital	0.00923***	0.00783***	0.00787***	0.00620***	0.00538***	0.00787***	0.00476***
	(0.00105)	(0.000988)	(0.000986)	(0.000961)	(0.000935)	(0.000981)	(0.000946)
Visuals	0.0516***	0.0425***	0.0431***	0.0432***	0.0402***	0.0412***	0.0327***
	(0.00192)	(0.00184)	(0.00184)	(0.00177)	(0.00173)	(0.00183)	(0.00157)
Constant	8.425***	7.374***	7.463***	7.456***	6.839***	8.332***	6.589***
	(0.375)	(0.355)	(0.355)	(0.344)	(0.335)	(0.351)	(0.341)
Observations	7,406	7,406	7,406	7,406	7,406	7,406	7,406

Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.2986	0.3757	0.3786	0.4128	0.4449	0.3850	0.5198
Adj R-squared	0.2957	0.3731	0.3758	0.4103	0.4425	0.3824	0.5176

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Year and category dummies are not reported above

Table 3 Results for testing with only software-related projects

	(1) Baseline	(5) Model 6	(4) Model 7	(3) Model 8	(6) Model 9	(2) Model 10	(2) Full Model
Explanatory							
Novelty		0.0316	0.333**			0.350**	0.381**
		(0.0865)	(0.157)			(0.144)	(0.149)
Diversification		0.180***	0.185***			0.123***	0.124***
		(0.0198)	(0.0199)			(0.0191)	(0.0193)
Novelty* Diversification			-0.0418**			-0.0415**	-0.0429**
			(0.0182)			(0.0168)	(0.0180)
Updates				0.368***		0.289***	0.291***
				(0.0396)		(0.0385)	(0.0391)
Updates Squared				-0.0104***		-0.00943***	-0.00913***
				(0.00200)		(0.00191)	(0.00183)
Comments					0.0171***	0.0106***	0.0135***
					(0.00195)	(0.00188)	(0.00215)
Novelty*Comments							0.00160*
							(0.000453)
Control							
Complexity	-0.0817	-0.141**	-0.154**	0.0661	-0.0916	-0.0298	-0.0291
	(0.0752)	(0.0713)	(0.0713)	(0.0696)	(0.0712)	(0.0667)	(0.0665)
Duration	1.16e-08	3.31e-09	4.04e-09	1.36e-08*	1.14e-08	7.88e-09	7.90e-09
	(8.03e-09)	(7.64e-09)	(7.62e-09)	(7.30e-09)	(7.60e-09)	(6.97e-09)	(6.95e-09)
Description	0.000485***	0.000270**	0.000300**	0.000304**	0.000467***	0.000224*	0.000210*
	(0.000129)	(0.000134)	(0.000134)	(0.000119)	(0.000123)	(0.000123)	(0.000119)
Social Capital	0.00508**	0.00506**	0.00514**	0.00296	0.00466**	0.00333*	0.00353*
	(0.00233)	(0.00220)	(0.00220)	(0.00212)	(0.00221)	(0.00201)	(0.00210)
Visuals	0.0474***	0.0275***	0.0281***	0.0336***	0.0397***	0.0199**	0.0195**
	(0.0109)	(0.0105)	(0.0105)	(0.00998)	(0.0104)	(0.00962)	(0.00932)
Constant	7.864***	6.416***	6.591***	6.321***	7.812***	5.889***	5.639***
	(0.543)	(0.540)	(0.544)	(0.513)	(0.515)	(0.510)	(0.506)
Observations	679	679	679	679	679	679	679

Prob>F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.1310	0.2269	0.2331	0.2847	0.2217	0.3649	0.3691
Adj. R-squared	0.1127	0.2082	0.2133	0.2674	0.2041	0.3446	0.3471

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Year Dummy is not reported above

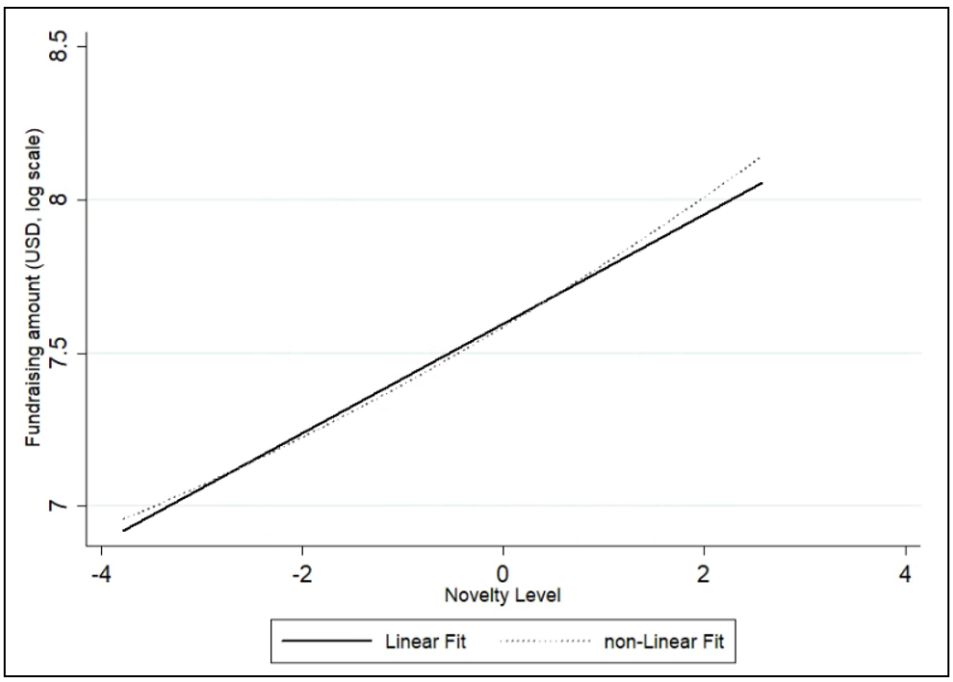


Figure 3 *Linear/non-linear relationship between novelty and project success (software)*

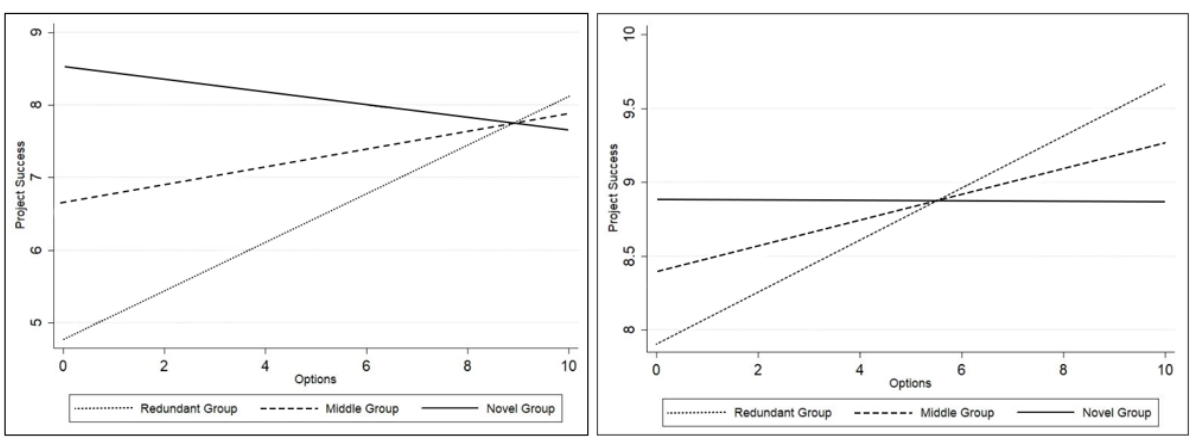


Figure 4 *Marginal effect of diversification on project success depending on novelty level*

(left: general, right: software)

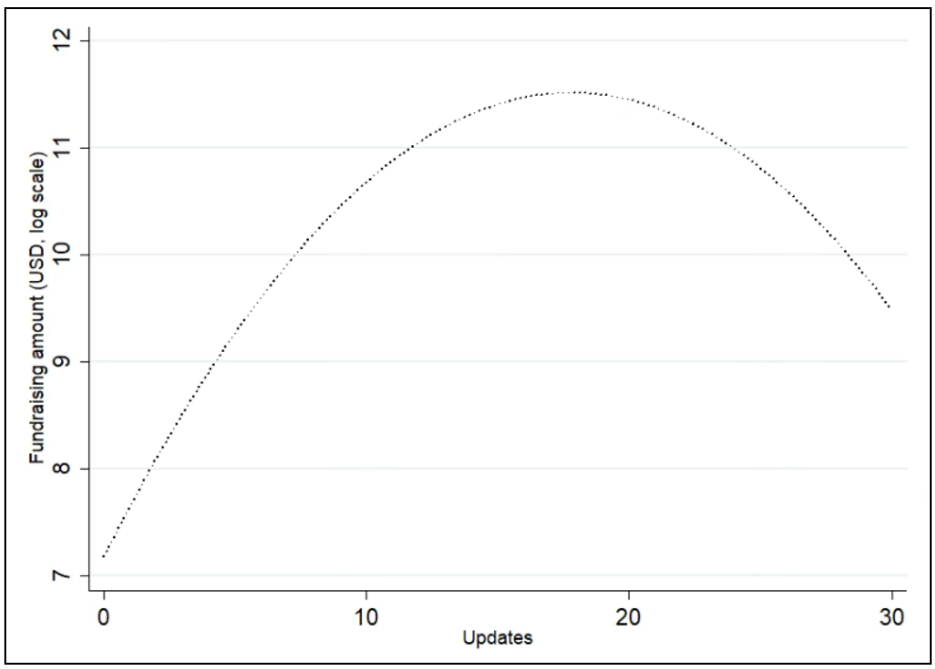


Figure 5 *Non-linear relationship between updates and project success*

Table 4 shows the group-separated regression results of our analysis for the robustness check. Model 12 and 13 verifies whether the effects of diversification are significantly different in the three groups divided according to the novelty level. The Redundant Group*Diversification term showed a positive significant (0.0429, $p < 0.01$) result, while the Novel Group*Diversification term showed a negative significant (-0.0236, $p < 0.01$) result. This result shows that the impact of diversification on project success is significantly stronger in the Redundant group and significantly weaker in the Novel group. For H6, the Redundant Group*Comments term showed a negative significant (-0.0122, p

<0.10) result, while the Novel Group*Comments term showed a positive significant (0.0136, p <0.10) result. This result shows that the impact of comments on project success is significantly stronger in the Novel group and significantly weaker in the Redundant group. In the F test to verify whether the difference between the groups had sufficient significance, the result supported our hypothesis by showing the F statistics value of 7.49 (Prob>F = 0.0006).

Table 4 Results for testing differences between groups

	(1) Model 11	(2) Model 12	(3) Model 13
Explanatory			
Updates	0.298***	0.295***	0.292***
	(0.0101)	(0.0101)	(0.0101)
Updates Squared	-0.00925***	-0.00909***	-0.00912***
	(0.000458)	(0.000458)	(0.000458)
Diversification	0.0894***	0.0843***	0.0875***
	(0.00419)	(0.00562)	(0.00426)
Redundant Group * Diversification		0.0429***	
		(0.00906)	
Novel Group * Diversification		-0.0236***	
		(0.00861)	
Comments	0.00743***	0.00743***	0.00715***
	(0.000300)	(0.000299)	(0.000315)
Redundant Group * Comments		0.0429***	-0.0122*
		(0.00906)	(0.00401)
Novel Group * Comments		-0.0236***	0.0136*
		(0.00861)	(0.00460)
Group dummy			
Redundant Group	0.0183	-0.352***	-0.312***
	(0.0479)	(0.0934)	(0.0910)
Novel Group	0.0624	0.296***	0.261***
	(0.0481)	(0.0970)	(0.0850)
Control			
Complexity	-0.0376**	-0.0380**	-0.0381**
	(0.0182)	(0.0181)	(0.0180)
Duration	3.59e-09**	3.64e-09**	3.62e-09**
	(1.68e-09)	(1.68e-09)	(1.68e-09)
Description	8.28e-06	2.59e-05	3.19e-05
	(3.37e-05)	(3.37e-05)	(3.37e-05)
Human Capital	-0.00468	-0.00445	-0.00455

	(0.00601)	(0.00599)	(0.00599)
Social Capital	0.00453***	0.00456***	0.00455***
	(0.000872)	(0.000870)	(0.000871)
Visuals	0.0299***	0.0300***	0.0300***
	(0.00165)	(0.00164)	(0.00164)
Constant	6.395***	6.408***	6.408***
	(0.316)	(0.318)	(0.318)
Observations	7,406	7,406	7,406
Prob>F	0.0000	0.0000	0.0000
R-squared	0.5178	0.5205	0.5198
Adj. R-squared	0.5154	0.5181	0.5175

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Year and category dummies are not reported above

Table 5 shows the regression results of the multi-model regression to measure the robustness of our hypotheses. In addition to the basic model presented, three statistical models from existing studies that deal with crowdfunding campaign successes were tested. First, in the same state as the previous model with the total fundraising amount as the dependent variable, Tobit regression was conducted following Piva & Rossi-Lamastra (2018). In Table 5, the Tobit columns show that the result supported the hypotheses in both the case of Full sample and the Software project only sample. At the lower limit of the 5% censored Tobit model, the difference in explanatory variable coefficients with the OLS result was less than 5%. Second, the dependent variable dealing with crowdfunding success was analyzed as success or failure with a Logit model following Colombo et al. (2015). In this case, where only success/failure was dependent, the result only partially supported the hypotheses of this study. In both sample configurations, the non-linear impact of updates and positive effect of comments were equally supported, while other hypotheses were partially supported. Lastly, a negative binomial model was applied to view the dependent variable dealing with crowdfunding success as the total number of participants, following Ahlers et al. (2015). This case met the purpose of this study in terms

of how many participants were gathered in the process of persuading ideas, and the results also supported the hypotheses.

Table 5 Multi-model robustness check result

	Full sample				**Software project sample**			
	OLS	Tobit	Logit	Negative binomial	OLS	Tobit	Logit	Negative binomial
	Total amount fundraised		Success	Funders	Total amount fundraised		Success	Funders
Explanatory								
Novelty	0.0919**	0.0882**	0.0954	0.179***	0.381**	0.370**	0.435*	0.212*
	(0.0403)	(0.0415)	(0.0681)	(0.0364)	(0.149)	(0.147)	(0.245)	(0.123)
Diversification	0.0846***	0.0895***	0.0263***	0.0669***	0.124***	0.125***	0.00263	0.0720***
	(0.00409)	(0.00425)	(0.00735)	(0.00377)	(0.0193)	(0.0190)	(0.0295)	(0.0148)
Novelty* Diversification	-0.0151***	-0.0162***	-0.00361	-0.0183***	-0.0429**	-0.0439**	-0.0268	-0.0130
	(0.00380)	(0.00386)	(0.00673)	(0.00373)	(0.0180)	(0.0171)	(0.0266)	(0.0145)
Updates	0.258***	0.298***	0.315***	0.241***	0.291***	0.295***	0.212***	0.249***
	(0.0106)	(0.0102)	(0.0187)	(0.00819)	(0.0391)	(0.0389)	(0.0652)	(0.0253)
Updates Squared	-0.00837***	-0.00920***	-0.00779***	-0.00554***	-0.00913***	-0.00952***	-0.00592*	-0.00886***
	(0.000497)	(0.000459)	(0.000921)	(0.000357)	(0.00183)	(0.00190)	(0.00319)	(0.00124)
Comments	0.0135***	0.0104***	0.0190***	0.00601***	0.0135***	0.0132***	0.0701***	0.0251***
	(0.000431)	(0.000401)	(0.00150)	(0.000301)	(0.00215)	(0.00208)	(0.0139)	(0.00250)
Novelty* Comments	0.00141**	0.00151*	0.00591	0.00150	0.00160*	0.00145*	0.00771	0.00161
	(0.000443)	(0.000486)	(0.000651)	(0.000295)	(0.000453)	(0.000410)	(0.000725)	(0.000315)
Control								
Complexity	-0.0778***	-0.0368**	-0.124***	-0.0841***	-0.0291	-0.0321	-0.265***	-0.0860*
	(0.0178)	(0.0181)	(0.0303)	(0.0152)	(0.0665)	(0.0670)	(0.0955)	(0.0474)
Duration	5.45e-09**	3.69e-09**	-2.97e-09	-4.61e-09***	7.90e-09	8.42e-09	4.34e-09	-3.18e-09
	(1.61e-09)	(1.67e-09)	(2.65e-09)	(1.32e-09)	(6.95e-09)	(7.01e-09)	(9.97e-09)	(5.15e-09)
Description	7.09e-05*	6.05e-05*	-0.000316***	-0.000138***	0.000210*	0.000233*	-0.000335*	-0.000112
	(3.25e-05)	(3.30e-05)	(5.72e-05)	(2.71e-05)	(0.000119)	(0.000126)	(0.000185)	(8.05e-05)
Human Capital	-0.00601	-0.00441	0.283***	0.0382***	-	-	-	-
	(0.00556)	(0.00606)	(0.0201)	(0.00635)				
Social Capital	0.00476**	0.00451***	-	0.0140***	0.00353*	0.00336*	0.0277***	0.0243***
	(0.000946)	(0.000891)		(0.00122)	(0.00210)	(0.00201)	(0.00941)	(0.00345)
Visuals	0.0327***	0.0302***	0.0190***	0.0261***	0.0195**	0.0199**	0.00405	0.00265

	(0.00157)	(0.00165)	(0.00322)	(0.00145)	(0.00932)	(0.00967)	(0.0145)	(0.00679)
Constant	6.589***	6.509***	0.455	3.059***	5.639***	5.877***	1.622	2.531***
	(0.341)	(0.315)	(0.644)	(0.259)	(0.506)	(0.525)	(1.215)	(0.351)
Observations	7,406	7,406	6,914	7,406	679	679	662	679
Model	F value	LR chi^2	LR chi^2	LR chi^2		LR chi^2	LR chi^2	LR chi^2
	221.10	5399.66	2516.53	5277.51		308.15	220.15	749.15
	Prob>F	Prob>chi^2	Prob>chi^2	Prob>chi^2		Prob>chi^2	Prob>chi^2	Prob>chi^2
	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000
		sigma		lnalpha		sigma		lnalpha
		1.546***		0.421***		1.66***		0.208***
		(0.0129)		(0.0140)		(0.0469)		(0.0482)
	Adj R^2	Pseudo R^2	Pseudo R^2	Pseudo R^2	Adj R^2	Pseudo R^2	Pseudo R^2	Pseudo R^2
	0.5176	0.1651	0.2744	0.0519	0.3471	0.1082	0.2495	0.0953

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Year and category dummies are not reported above

Table 6 reports the regression result performed for the purpose of the robustness test for the deep-learning-based novelty detection model. In addition to the novelty proxy method presented in this study, a keyword phrase search was used as an alternative measure of the proposed crowdfunding idea's novelty. We measured whether or not the founder used phrases extolling the project's novelty, specifically, how it was a new concept and how it differed from existing projects. We assigned this value as Appeal newness variable, and subsequently, the same multi-model regression as above was performed with a new proxy replacing Novelty. This process does not capture the novelty felt by a participant, but rather a project personality that the founder judged for oneself; it was an alternative method to supplement our original approach. The result supported our hypotheses, with partial support on the Logit regression, which was the same as the previous result.

We found the following. First, it was advantageous to have focused strategies when attracting crowd investments for high-novelty-level projects. In contrast, for low-novelty-level projects, target diversification was an effective strategy for successful crowdfunding.

Second, founders' updating of information in the middle of fundraising was verified to have a non-linear quadratic relationship with project success and balancing changes were shown to act as stimuli that help project success. Third, our results showed that two-sided communication enhances clarity and intimacy, which can improve idea delivery and acceptance.

Table 6 Alternative measure of novelty robustness check result

	Full sample with alternative measure of novelty			
	OLS	Tobit	Logit	Negative binomial
	Total amount fundraised		Success	Funders
Explanatory				
Appeal newness	0.540***	0.560***	0.0988	0.394***
	(0.0936)	(0.0941)	(0.147)	(0.0819)
Diversification	0.137***	0.139***	0.0249*	0.0958***
	(0.00873)	(0.00877)	(0.0141)	(0.00789)
Appeal newness*Diversification	-0.0604***	-0.0620***	-0.00586	-0.0383***
	(0.00961)	(0.00965)	(0.0157)	(0.00860)
Updates	0.301***	0.302***	0.300***	0.239***
	(0.00989)	(0.00991)	(0.0171)	(0.00789)
Updates Squared	-0.00935***	-0.00941***	-0.00788***	-0.00556***
	(0.000453)	(0.000454)	(0.000841)	(0.000345)
Comments	0.00774***	0.00774***	0.0124***	0.00695***
	(0.000297)	(0.000297)	(0.00113)	(0.000313)
Control				
Complexity	-0.0326*	-0.0334*	-0.141***	-0.0830***
	(0.0177)	(0.0178)	(0.0282)	(0.0146)
Duration	2.08e-09	2.16e-09	-6.92e-09***	-5.43e-09***
	(1.62e-09)	(1.62e-09)	(2.52e-09)	(1.26e-09)
Description	1.56e-05	1.50e-05	-0.000232***	-0.000144***
	(3.19e-05)	(3.19e-05)	(5.17e-05)	(2.61e-05)
Human Capital	-0.00287	-0.00274	0.191***	0.0385***
	(0.00585)	(0.00586)	(0.0165)	(0.00626)
Social Capital	0.00486***	0.00486***	0.0244***	0.0138***
	(0.000865)	(0.000866)	(0.00340)	(0.00121)
Visuals	0.0292***	0.0292***	0.00936***	0.0251***

	(0.00156)	(0.00156)	(0.00265)	(0.00139)
Constant	5.961***	5.940***	3.612***	2.752***
	(0.324)	(0.325)	(0.677)	(0.264)
Observations	7,406	7,406	6,914	7,406
Model	F value	LR chi^2	LR chi^2	LR chi^2
	220.15	5201.87	2467.42	5212.48
	Prob>F 0.0000	Prob>chi^2	Prob>chi^2	Prob>chi^2
		0.0000	0.0000	0.0000
		sigma		lnalpha
		1.557***		0.426***
		(0.0126)		(0.0136)
	Adj R^2	Pseudo R^2	Pseudo R^2	Pseudo R^2
	0.5085	0.1611	0.2623	0.0521

3.3.6 Discussion

This study argues that crowdfunding success depends not only on proactive project determinants but also on strategic actions that entrepreneurs can perform during the campaign period. Furthermore, we argue that the effectiveness of strategic actions can vary depending on the project's novelty level.

Our first hypothesis (H1) examined whether project novelty leads to successful fundraising outcomes in crowdfunding projects. In general, when dealing with startup success factors or investment attraction strategies, it is difficult to guarantee success with just a heterogeneity of ideas themselves. Our test results reported in Table 2 show support for H1. Although the direct effect was not the main concern of this study, we considered whether there could be differences among project categories. The particular interest was in software-related projects, where the creativity of descriptive ideas appears to play a primary role in attracting interests, due to the category characteristic of software industry that novel projects are highly valued (Akman and Yilmaz, 2008). Our empirical results

proved that describing creativity attracts potential funders. Consequently, different from other fields, the positive impact of novelty on software projects appeared significantly, and it was found that the overall interest of funders in software projects came from curiosity in newness. According to the characteristics of the software industry that emphasize creative work (Brook, 1987; Fagan, 2004), crowds are more open to innovative trials. In addition, software products play an important role while positioning within the ecosystem, such as platform providers and service relationships, more than individual products (Kim & Altmann, 2022). Accordingly, a network is formed in which various software services appear in tandem and strengthening connectivity between products can enhance performance by improving the network position of a software (Kim et al., 2020). This characteristic seems to have minimized the adverse reaction to diversification even in a situation where uncertainty regarding the novel idea was high. Our test using 679 software project samples showed that novelty had a significant linear effect, as shown in Table 3. Meanwhile, there was no direct relationship when testing in the gadget, robots, and hardware categories.

Based on the main research objective, we set up a research frame that outlines three different strategic actions that startup founders can utilize during the fundraising period: target diversification, project updates, and two-sided communications. The pattern of influencing crowd participation in each case was theorized and explored through empirical analysis. Moreover, we looked at how the effectiveness of each strategy can vary according to the novelty level.

Diversification attempts to cover more potential funder targets act as an assortment for funders (Bélanger et al., 2015; Chernev et al., 2015). The effect of expanding pledge objectives for target diversification was statistically significant as it attracted a wide range of funders in general. However, this effect showed a significant magnitude when the project was ordinary and had familiar idea descriptions that crowds could easily understand from previous knowledge. The negative moderating effect of the project idea's novelty level on the relationship between diversification and project success was supported by the empirical analysis, and its magnitude and specific patterns needed to be examined by looking at the data in-depth. In the high-novelty projects, the positive effect of diversification was gradually weakened and found to be almost flat. This moderating effect was found not only in the total amount of fundraising (Table 5) but also in the number of investor acquisitions, and was confirmed in repeated robustness tests (Tables 4 and 6). The negative impact of such diversification comes mainly from increase in cognitive costs (Chernev, 2006), and the result shows that the cost is maximized as projects with high novelty are plagued with issues of high uncertainty and low reliability. In this situation, while it is necessary for the founder to make appropriate trust-building signaling and reduce the information gap, excessive diversification rather increases complexity and acts as a negative signal. The most distinct result came out from software-related projects. Among software categorized projects without a manufacturing process, the harming effect of diversification was less flattened (Table 3) than in general projects. In the revolving area where a clear and focused project design was required for heterogeneous projects, our

results suggest that opening too wide a possibility can be detrimental. This finding shows that it is important to secure focused targets who value proposal details, and this trend is even stronger in markets where competition for newness is fierce. It also implies that entrepreneurs should implement strategies focusing on investors who are attracted to strong differentiation when proposing radical ideas. From the perspective of signaling theory in the flow of existing research (Connelly et al., 2011), in the case where the message delivered has a high novelty level, it means that the signaler should pay more attention to clear contents delivery so that the receiver can focus on the information and clearly understand. Our finding here contributed on literature stream of signaling theory in the fundraising effort cases by empirically testing that excessive signal of information due to excessive project scope setting can even increase the information asymmetries and reduce reliability. Accordingly, it has been shown that the range and amount of signal contents should be varied according to the level of novelty of their delivering message. By reconfirming the importance of presenting an appropriate milestone in the existing investor attraction research dealing with signaling theory (Ahlers et al., 2015), our study further demonstrated it in crowdfunding contexts to broaden the scope of the theory.

Entrepreneurs' strategic choices for updating information and making agile changes has also received recent research attention (Ahlers et al., 2015). Our result has shown that, in this flow, an appropriate level of transformation based on crowd feedback and notification is beneficial to attract funders in reward-based crowdfunding. Indeed, we observed a statistically significant effect of updates on crowd participation. However, the

correlation showed non-linear results which were different from those seen in previous studies (Xu et al., 2014). We noticed that updates that deliver information might be valued highly by crowds (Block et al., 2018), but this tendency could also have unwanted effects. Changes in project aim or direction, or in team information might negatively affect a project's credibility, which is a key factor in effective communication in signaling theory. In addition, too many updates in a short period of time appear to be perceived as "cheap talk" or insincere (Block et al., 2018), disturbing main signal contents. Delivering the right content at an adequate frequency is required to make updates strategically. Investors do not want to receive trivial information too often; they may consider it spam. Nonetheless, they expect to receive information as the project proceeds. To signal the startup's quality and implementation capability, updates should be concise and should be made at appropriate junctures. On the other hand, this complex nature of project updates made it difficult to look at strategic changes according to novelty levels in one direction. In a novel project with a large information asymmetry, the smooth transfer of information can be a positive quality signaling and at the same time a negative signal on credibility that leads to unclear misunderstandings. Rather than acting as a signal in the direction of simply reducing the information gap, it showed two-sided characteristics. Depending on the characteristics of the update, it narrowed the information gap or added more confusion. Therefore, how these two-sided characteristics specifically affect non-linear patterns in novel ideas with wide gaps and low reliability remains a limitation that cannot be addressed in this study. In a follow-up study, it will be helpful for strategic understanding to classify the types and

characteristics of updates, and to examine the differences in moderation effects.

The third strategic action, two-sided communication, refers to both founders and potential investors conveying information to each other and forming relationships (Gómez-Diago, 2015). Our regression results showed that this behavior as statistically significant to help fundraising, which is in line with the conclusions of similar studies (Dorfleitner et al., 2018; Kunz et al., 2016). This finding suggests that it is important for a founder to clearly convey an idea's description and reliability simultaneously in an investment environment where information asymmetry is rampant, in signaling for fundraising situation. Even if the idea is initially posted with sufficient description, it is not easy to fully convey it to consumers with a non-ready-made product (Mollick, 2014). In addition, the pre-purchase of new products that have not yet been implemented is accompanied by a sense of anxiety about project progress (Belleflamme et al., 2014). It appears that communication primarily contributed to disclosing information to the crowd and helping to address their doubts. An intimate relationship with the founder through appropriate communication seems to increase trust in the project and promote further participation. These signaling effects of two-sided communication precisely matched the need for the novel idea. The more novel ideas, there were the more strongly the effects of efforts to build trust and reduce information asymmetry. Therefore, for effective fundraising, entrepreneurs need to strategically respond to potential investors' information requests during the campaign and try to build a project-related community. This is an extension of the existing investor persuasion strategy studies that deals with signaling theory (Connelly

et al, 2011; Ahlers et al., 2015), and has the distinction of showing that the effectiveness of the strategy varies according to novel ideas. The characteristics of the novel idea were defined as the high level of information asymmetry and the fact that the signal receiver importantly considers the reliability of the signal, and the effect thereof was tested empirically. Through this, it showed the effect of communication appearing in two axes of signal and signaler-receiver relationship, and contributed to expanding the scope of application of the theory.

Based on the hypotheses verified in the study, we offer practical implications for startup entrepreneurs who wish to proceed with fundraising through crowdfunding. Studies exploring the factors of founders to achieve successful results in crowdfunding are varied, but they mainly focus on factors determined in advance, such as the founder's education (Ahlers et al., 2015), social network (Colombo & Franzoni, 2015), and textual description details (Marom et al., 2013). Meanwhile, the implications of this study are that the best results can be induced by taking strategic actions during the funding period. Founders might first figure out how familiar their project is to conventional users, in order to adjust the scope of funding options accordingly. In the case of a challenging radical project, it is effective to narrow the target by setting fewer options. However, for incremental ideas, a target diversification strategy that can cover a wide range of funders should be pursued. In addition, even after funding starts, information updates on the crowdfunding platform should be used appropriately and efforts should be made to revitalize the community so that active communication takes place.

In addition, a methodological contribution was made to broaden the computational approach of the current managerial literature stream. The development of natural language processing techniques in the field of computer science has been a breakthrough in various management academic fields that derive scientific analysis from texts (Kang et al., 2017). This advancement suggests an effective alternative to research in the fields of novelty and innovation, which is difficult to grasp especially with only a few limited quantitative indicators (Jiang et al., 2018; Savov et al., 2020; Yan et al., 2012). In particular, the application of a novelty measurement method to describe an idea, as proposed in this study, can be used as a method to proxy novelty of technology by similarly applying it to not only business ideas but also to patents and other public documents of firms as well. It has implications for researchers who are interested in measuring ex-ante novelty in different fields of innovation.

Our study has a limitation in that the proposed method of testing the novelty is somewhat challenging. Although verifications of dataset accuracy have been completed in multiple studies related to computer science, the verification of whether our pre-processing for use in a business description is sufficient and appropriate may be controversial. To supplement this drawback, we suggested an alternative proxy in the study. Supplementing the audience's evaluation of the novelty of business wording will help develop an advanced model through model fitting. We argue that it was an adequate approach to measure ex-ante business novelty in the fundraising context and to examine its impact. This method may be further utilized in future studies to broaden the understanding of novelty, which

has been limited in existing management studies. Thus, the strategic differences that may vary depending on novelty level can be divided into more detailed situational units that will be seen in future studies. There are also some limitations in the method for proxying control variables. In the visualization level for explaining the project, it was difficult to estimate the difference according to the video length in the case of video, so it was not handled. Also, among the various methods for measuring founder's social capital, the method using an external social network was not dealt with due to incomplete data. Our study also has a limitation in using samples limited to tech-related projects within crowdfunding projects, as we tried to deal with the area where the quantitative comparison of idea description was possible. We also expect that applications to other types of fundraising cases and reward-based crowdfunding would enrich the research findings. However, it was difficult to format the business description at the time of venture capital attraction; hence, this study has limitations that are left as a study scope for the future. Testing which characteristics make novel ideas more appealing in channels other than crowdfunding is another promising path for future research.

Chapter 4. Delivering Satisfaction after Crowdfunding through Utilitarian and Hedonic Value Structure

Abstract

Crowdfunding has triggered an alternative-finance revolution by allowing entrepreneurs to raise money from a large number of people via non-traditional channels such as online platforms. Raising funds through reward-based crowdfunding is only one step as production capital seeking; however, it is essential to satisfy those who have participated in the process of developing further business. As early market consumers, the response of funders on crowdfunding platforms can signal the future market prospects of the product. Therefore, revealing what factors drive funder satisfaction with a project can lead to a deeper understanding of the competitive further development of business after initial fundraising. Exploring satisfaction building process after fundraising is therefore important for understanding entrepreneurial process through crowdfunding. We describe the mechanism by which an idea realization leads to the satisfaction of the funder from two aspects: utilitarian and hedonic value delivery. The study analyzes 2,126 projects that were implemented after successful fundraising and used the review comments of the funders to empirically estimate the effects of project characteristics on satisfaction during the crowdfunding experience. The results reveal that the total pledged amount during the crowdfunding campaign, past project experience of the entrepreneur, active communication between the entrepreneur and funders, and visual description of the project proposal have positive impacts on the overall funding satisfaction of the funder. The study explains the results in two different value delivery process and gives important implications for entrepreneurs that who participate in the special environment of crowdfunding value not only product quality but also the emotional happiness of participating in the innovation process.

Keywords: Idea realization, innovation, crowdfunding, consumer satisfaction, utilitarian value, hedonic value

4.1 Introduction

Fundraising plays a significant role in the process of innovation, from idea generation to implementation and further development into a successful company. Successful idea-level funding is defined as winning the competition between ideas (Fisk et al., 2011), and winners move on to the implementation phase of idea realization (Perry-Smith & Mannucci, 2017). In the highly competitive startup environment, crowdfunding has been drawing attention as an alternative investment-attraction model (Belleflamme et al., 2014). Among crowdfunding, the reward-based model has different characteristics from other general startup investment attractions. The funders are also early adopters of the product, making the crowdfunding platform valuable to the entrepreneurial process for both early consumer feedback and fundraising practice. Additionally, an online crowdfunding platform is a valuable resource for empirically understanding the implementation and delivery process of ideas because of the nature of the datarizing interaction of a large number of people. Therefore, when dealing with idea delivery through a reward-based model, the consumer perspective must be considered together, and the online platform becomes a very suitable material to explore.

Proposing creative product idea through crowdfunding and delivering satisfactory ideas in the process of realizing them is the starting point for a successful new company. It is not easy to deliver satisfaction to the participants who funded only with the expectation of presenting ideas. In fact, the reason many online platforms receive disappointing reviews from the majority is because they have received disappointing products from their

platform participation experience. In order to examine and explain what factors make success in idea realization in this process, the study borrow consumer theory that deals with the process of creating consumer satisfaction and interpret it as the delivery of two values: utilitarian and hedonic value. The study examines what differences in the determinants and process of fundraising affect each of these value deliveries and ultimately lead to a satisfactory customer experience.

The two values that describe the funder satisfactory delivery process are as below. The first is the utilitarian value according to the practical advantage felt by receiving the product that was only an idea. This is due to the ability of the founder to properly realize and deliver the value he was talking about, and in this study, secure of capital and human capital for the realization of sufficient ideas are seen as the core that directly affects the capacity. The second is a hedonic value that reflects the pleasure associated with funding participation, independent of the objective completeness of the product. It is an unique characteristic of the crowdfunding process that is differentiated from simply purchasing a product online, and the emotional satisfaction of realizing a creative product is the main axis. In this study, how much the funder feels involved in the realization process was considered as the core of hedonic value delivery. In the process of crowdfunding, emotional involvement in the product was identified as a visualization level of idea delivery, and emotional empathy through communication in the subsequent stage was hypothesized as another factor.

For our empirical analysis, we use original web-crawled data from a leading online

reward-based crowdfunding platform. We measure consumer satisfaction using sentiment analysis on a large number of crowdfunding samples. Then, we use WLS and two-stage least regression (2SLS) analysis to verify the results.

The remainder of the paper is organized as follows. Section 2 provides the theoretical framework of our research and develops hypotheses. Section 3 states our research objective and presents the methodology with original data sources. We use a sentiment analysis model to test our hypotheses. Section 4 presents the descriptive statistics and results from the empirical tests, and interprets them. Section 5 summarizes the main conclusions of the study and discusses its limitations.

4.2 Theoretical Background

4.2.1 Idea realization in crowdfunding

Timely funding is an important success factor to convert an idea into a competitive company. In this regard, crowdfunding became popular alternative investment attraction method to secure fund from an unspecified large number of investors (Ley & Weaven, 2011; Belleflamme et al., 2014). Among the different types of crowdfunding, reward-based online funding platforms are investment models that promise product rewards after the ideas presented are realized, and are most actively growing (Frydrych et al., 2014). Reward-based crowdfunding begins with the founder posting new business ideas and reward accordingly. When enough funders gather, the founder implements the idea and deliver reward to funders. This form of platform is a space where potential customers of

posted creative ideas can participate in funding.

Idea realization develops through the processes of idea generation, elaboration, championing, and implementation (Perry-Smith & Mannucci, 2017). However, many difficulties and uncertainties are scattered at each stage. Entrepreneurial financing research mainly focuses on exploring fund-attracting strategies for novel business ideas that can overcome such difficulties (Drover et al., 2017; Nadeau, 2010). The extant crowdfunding literature has traditionally focused on the successful investment attraction process and identifying the determinants that make a successful fundraising campaign (Mollick, 2014). From the innovation process perspective, fundraising itself in crowdfunding corresponds to idea championing among competitive ideas. However, due to the nature of the reward-based model described in the previous paragraph, product delivery after fundraising on crowdfunding platform can also plays an important role in understanding the implementation stage of realization process.

4.2.2 Market feedback from funder satisfaction after fundraising

Several studies have been conducted focusing on the implementation stage characteristics of crowdfunding, and this starts by defining the funder in online reward-based crowdfunding as also the initial user of new products (Steigenberger, 2017). Moreover, even from a founder's point of view, crowdfunding has additional functions beyond simply attracting funds. Thus, it is a great way for a company to raise initial funds and identify responses from the initial market simultaneously (Zheng et al., 2017). In terms

of venture capital investor attraction strategies, reward-based projects that have received successful feedback are attractive to more subsequent investors because they can expect good results based on the market response (Roma et al., 2018). Therefore, research on funder satisfaction after receiving the product has implications for estimating competitiveness of an early new firm. Nevertheless, although funding results for reward-based crowdfunding can be easily quantitatively measured, tracking consumer responses after receiving the realized product is not straightforward. Some studies have addressed the antecedents that drive sponsor satisfaction after crowdfunding (e.g., Xu et al., 2016; Zheng et al., 2014), but have not been successful due to the limitations of acquiring after-fundraising information from online funding platforms, forcing the majority of crowdfunding satisfaction research to use surveys (e.g., Mollick & Ethan, 2014; Zheng et al., 2017).

Zheng et al. (2017) classified the sponsor satisfaction factors of reward-based crowdfunding using multiple indicators. Using data from a survey of users of China's crowdfunding services, they identified funding characteristics that influence final satisfaction. Earlier, Dvir et al. (2003) found that indicators of project success could be different among different project types. However, the satisfaction factor was important for success for most projects because it is related to the competitiveness of the business later stages. Customer satisfaction is traditionally defined as the perception of performance in relation to the customer's expectations (Schiffman & Kanuk, 2004). Since satisfaction of early customers leads to market success and firm competitiveness (Bitner & Hubbert,

1994), most studies have explored satisfaction to verify which project would survive longer.

In reward-based crowdfunding platforms, the satisfaction level of participation depends on the special duality of these platforms, where the funder plays two roles: a product buyer and a paying source of innovation funds. The process as a buyer is suitable to be explained through widely studied two-appraisal model of satisfaction of the shopping experience studies (Oliver, 1989; Weiner, 1986). That is, whether the usage value of the product and the emotional value of the buying process are evaluated simultaneously or individually and combined to explain satisfactory.

The first among these is usage value, that is, functional satisfaction itself. This happens due to product quality, whether the product really meets the basic requirements of the consumer. In the crowdfunding process, this often causes a lot of dissatisfaction of funders because the quality of the actual product depends on the outcome of a successful realization of the idea under uncertain conditions and involves many-sided difficulties. Quality defects or deformations in the process of actual implementation of ideas drives funders to feel dissatisfaction as consumers (Chowdhary & Prakash, 2005), resulting in a negative overall level of satisfaction of crowdfunding experience. The second factor is the emotional satisfaction of participating in innovation, which can be explained by the participatory mechanism of crowdfunding. Apart from the implementation of the product function itself, attachment and participation as a funder in the new idea itself affects the overall satisfaction of the process. The process depends on whether the project founders provide enough emotional pleasure to the funders through the process of participating in

the creative process.

4.2.3 Idea implementing capacity: delivering the utilitarian value

Perry-Smith & Mannucci (2017) have conceptualized realization steps in the order of idea generation, elaboration, championing, and implementation. Idea implementation is the process of producing an idea after its selection, thus creating a tangible outcome and its subsequent use and diffusion. Nevertheless, creativity of ideas does not ensure a successful realization, as not all creative ideas achieve the desired quality and level. From the perspective of usage, the first element of satisfaction with the final product is whether the product meets the proposed functional requirements. This is about objective product quality, and whether it is achieved in compliance with the basic requirements described in the idea proposal. From a value delivery point of view, this is about how effectively the utilitarian value is delivered to the funder.

Customer-related studies have found that failure to meet basic requirements directly affects the consumer dissatisfaction rate (Babin & Darden, 1995; Babin et al., 1994). Satisfaction judgments comprise affective and cognitive elements (Mano & Oliver, 1993; Oliver & Swan, 1989). Among them, the affective aspect means that whether consumers can obtain functional requirement value through product purchase. Owing to the nature of crowdfunding, where purchase decisions are made at the raw idea stage rather than the finished product one, successful implementation is crucial obtaining the quality. In other words, the utilitarian value of participating crowdfunding is determined by factors that

influence the successful functional realization of proposed ideas.

The reason why most ideas that seem novel at first do not lead to successful implantation has been a long-standing concern. In the innovation process research, wrong or excessive plans, resource limitations, situational changes, and unexpected environments are cited as the cause for the failure of idea implementation. In the production phase, ideas develop into tangible products or services. Additionally, the phase includes confirmation of specific production designs, selection of production processes, procedures, and distribution strategies. Nonetheless, in the idea implementation process, the founder may face difficulties that he or she did not consider at the idea generation stage. Unexpected situations can also occur due to environmental and technological changes. As such, not all selected ideas will result in successful production (Van de van, 1986).

Completeness and functional fidelity of the product is a fundamental factor in customer satisfaction, as shown by many consumer studies (Hirschman & Holbrook, 1982). The ability to respond to many uncertainties and crises ultimately determines whether successful functional completeness is achieved through these adversities. Pinto & Prescott (1988) highlighted the importance of smooth resolution of technical tasks and environmental troubleshooting. Looking at the capacity factor for implementation capability in the perspective of crowdfunding can help understand the utilitarian value delivery factor. Sufficient funding serves to increase the founder's ability to respond to high uncertainty through resource surplus. It is the capacity to minimize the effect of possible environmental changes and to reach the idea according to the functional requirement

originally intended to provide until the end.

Some post-crowd satisfaction studies; for instance, Zheng et al. (2017) proposed that two factors must be met to satisfy project funders after crowdfunding: meeting proposed specifications and delivery timeliness. Sufficient funds are needed to comply with planned schedules and minimize changes in product implementation. Securing targeted funds is considered the end goal of crowdfunding in common, but securing more than minimal sufficient fund also makes important competitive advantage on next step of development for the project to develop into a successful startup. Ensuring scalable funds will help secure utilitarian value delivered to the funder.

H1: The overall pledged amount during the crowdfunding campaign has a positive impact on the overall funding satisfaction of the funder.

Another major factor affecting the response in the aforementioned uncertain environment and adherence to implementation time is the founding team's own capabilities, human capital. Human capital of the project founder, specific to crowdfunding, which determines the entrepreneurial team's implementation capacity. (Brown et al., 2016). Crowdfunding research has found that this human capital of founder is also a factor that helps funders decide which idea to fund, and the mechanism is found in funder's confidence in whether the proposed project can be successfully implemented. Thus, the public has invested favorably in projects with more experienced founders with efficient human resource management, which can be expressed in terms of human capital factors, such as the founder's prior campaign experience and educational background (Ahlers et al.,

2015; Piva & Rossi, 2018).

This funder's expectation does not stop at a wrong judgment but represents the actual implementation performance. It was revealed that various existing experiences in entrepreneurship research strengthen the entrepreneur's ability to respond to subsequent challenges. Crowdfunding involves the realization of challenging ideas through fundraising for technical proposals that do not already exist. Initiatives developed from past experience play an important role in agile responses to radical innovation situations (Deichmann & Ende, 2014). Therefore, an experienced entrepreneur can deal more efficiently with the uncertainty associated with project implementation and respond more flexibly (Belout. 1998).

H2: The past project experience of an entrepreneur has a positive impact on the overall funding satisfaction of the funder.

4.2.4 Emotional satisfaction of participating innovation: improving the hedonic value

The second axis that creates satisfaction in customer research is the emotional aspect (Machleit & Mantel, 2001). The delivery of the hedonic value that explains this process is from the joy itself felt by the participants in the shopping process (Babin & Attaway, 2000). This means that apart from the joy that comes from the function of the product, customers also seek happiness according to the process (Babin et al., 1994; Botti & McGill, 2011). For example, while shopping, the hedonic value comprises pleasures such as the pleasure

of looking around the store or pleasure from the buyer-seller relationship.

Among the crowdfunding experience, the reward-based model has some points similar to the shopping experience but has a unique differentiation. Consumable investment through crowdfunding has a peculiar nature: it invests in creative products, rather than simply shopping for products through common online shopping. Crowdfunding participation experience gives pleasure of participating in the innovation and creative process, and the participants who find and fund crowdfunding are the people who value it. Therefore, project founder must deal with the user as a customer and an investing partner simultaneously. In this process, maximizing emotional feeling of attachment for funders who value participating innovation becomes a crowdfunding strategy that maximizes hedonic value delivery.

In the process of crowdfunding, direct interaction can be seen first as a factor that makes attachments. The increased sense of commitment ultimately creates hedonic attachment to the product, resulting in high satisfaction, thus increasing the acceptance of the final idea implementation outcome and the recognition of implementation success (Carlile & Rebentisch, 2003). Therefore, it is an advantageous strategy to secure competitiveness by making the funders feel that they are actively participating, which can be done through active communication on the online platform. An active dialogue between the founder and the funder acts as a positive feedback process that can resolve information imbalance, reflect the customer needs in the idea implementation process, raise the awareness of participation, and contribute to building intimacy with the founders, thus

increasing trust.

H3: The communication activity on the crowdfunding project page has a positive impact on the overall funding satisfaction of the funder.

Second factor that makes attachments can be derived from clear understanding of novel ideas and shared understanding between two parties: founder and funders. In terms of the hedonic value, a funder may want the transparency of information. While describing the project at first for fundraising, the founder tries to attract as many investors as possible and thus might provide only favorable information resulting in information disparity, whereas the funders might loss emotional tie to the project. Previous literature on creativity emphasized the importance of shared understanding for a practical implementation phase (Cardinal, 2001; West, 1990). Resolving information imbalances and forming a common vision enhances the commitment of participants and maintains the funders' emotional attachment to the project (Hargadon & Bechky, 2006). In the process of indirect innovation participation through crowdfunding, having accurate information could have similar effects on perceived commitments. In the shopping satisfaction literature, this is expressed as having fun during the in-store experience process (Babin et al., 1994; Wakefield & Baker, 1998). The factor that most intuitively reveals this in the fundraising process of a crowdfunding platform is how visually the project was revealed from the beginning.

In addition, cognitive intimacy can be strengthened because the visual materials, and can reduce possibilities of dissatisfaction due to misunderstanding. Product dissatisfaction is not only due to functional errors, but also to misunderstandings about the product (e.g.,

expectancy-disconfirmation). Thus, efforts to sustain a sufficient information balance will deliver an accurate understanding of the product and reduce dissatisfaction due to misunderstanding (Oliver, 1997).

Crowdfunding research has also identified visual aids as positive factors for funding success (Belleflamme et al., 2014). The easiest way to communicate information about a new concept product that has not yet been implemented is visual communication, as visual description of the proposed project through an image or a video can play a vital role in reducing the information gap between investors and founders. Further, provision of image information in online communication can be indistinguishable from the textual description in terms of clarity and specificity (Mollick, 2014). For example, visual aids (e.g., images, videos) help consumers understand proposals that cannot be communicated clearly with a textual description, thus strengthening the founder-funder understanding.

H4: The visualization of project description on the crowdfunding project page has a positive impact on the overall funding satisfaction of the funder.

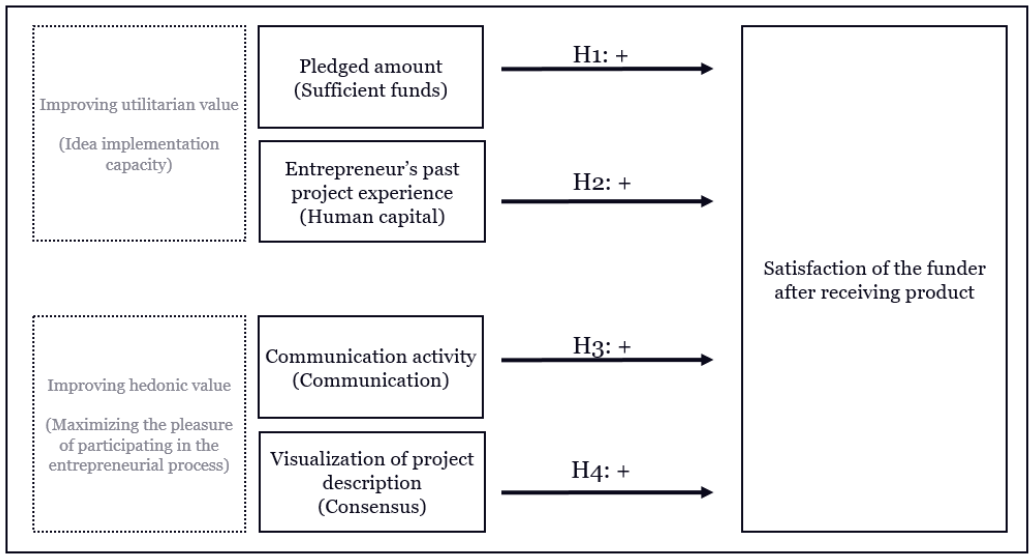


Figure 1 *Research model*

4.3 Research objective, Methodology, and Data

4.3.1 Research objective and data source

This study aims at identifying the factors affecting satisfaction with the crowdfunding experience through two different types of value delivery mechanism and offers suggestions for entrepreneurs who consider reward-based crowdfunding to act as a successful product launch platform.

Our empirical analysis uses original web-crawled data from the leading online reward-based crowdfunding platform, Kickstarter.com. The platform opened in April 2009 and became a representative data source for crowdfunding research (Mollick, 2014; Kuppuswamy & Bayus, 2017). It continues to grow as the most powerful crowdfunding platform, with more than 300,000 ideas posted in the last decade for investors to choose.

We crawled all possible project-related information of successful project on the website including the communication data and investor reviews posted on each project. For our analysis, we employed natural language processing techniques on textual data from project description and comments. Therefore, we only selected projects with a description written in English. Furthermore, since this study estimates the investor satisfaction after the tangible products are shipped, only projects in the technical field offering tangible rewards were collected.

After eliminating project observations with errors from the collected data, the final sample consisted of 2,126 unique project cases. These projects succeeded in attracting 984.6 investors on average, with 2,093,246 investment decisions included in the analysis data. The total fundraising amount was USD 255.51 million. Our analysis data included 46,822 information update posts by founders and 791,595 comments.

4.3.2 Dependent variable

We set a continuous measure to proxy funder satisfaction after receiving reward products based on user communication on the platform. In previous related studies, funder satisfaction in crowdfunding was measured primarily surveying of people who participated in funding (e.g., Mollick & Kuppuswamy, 2014). However, in online consumer research, studies on consumer satisfaction have been actively conducted using computational skills (Lee & Hu, 2005; Xiang et al., 2015). Studies on online customer reviews have mainly dealt with customer rating data (Schuckert et al., 2015). However, as the techniques for

natural language processing have evolved, interest in textual review data has been increasing (Xiang et al., 2015). We classified the comments left by the funders after the products were received and conducted a sentiment analysis of the texts using NLTK VADAR packages on Python (Hutto & Gilbert, 2014). This framework is specialized in semantic analysis of social media comments with liberal language usage, model reliability has been verified in multiple existing studies. The average of the compound sentiment result of comments left in each project was measured as a value between -1 and 1. To cope with sentiment errors that may occur due to project-specific words, we controlled by using the same proxy method at control variable of before-receiving-the-reward sentiment.

4.3.3 Explanatory variables

Pledged: The fundraised amount is a common interest in related research as a dependent variable to evaluate crowdfunding success. Since, in H1, we expect the size of the fundraised amount to affect consumer satisfaction, fundraising result data from the online platform was collected.

Communication: The online reward-based crowdfunding platform provides comment sector for funders and founders to talk freely. The activeness of the conversation in this feature shows the efforts done to communicate by founder within the project framework. Since our primary interest is the founder's effort, we counted the number of comments left by the founders among all collected comments.

Experience: We measured project founder's past founding experiences. Before

starting the focal project, the number of previous crowdfunding projects was counted.

Visualization: The active use of visual resources in project descriptions was frequently addressed as success factor in previous crowdfunding studies (Mollick, 2014). We followed the same approach to measure how well the founder visualized the idea. The number of image and video materials included in the project description was counted.

4.3.4 Control variables

We incorporated control variables that might affect the funder satisfaction after crowdfunding. First, we controlled for the sentiment that has formed throughout the project community page before receiving the product. Since the main concern of this study is to examine the factors that affect the satisfaction of consumers through the successful implementation of the product, the overall sentiment that was formed before the project implementation was controlled for and measured similarly using natural language processing techniques as a dependent variable. By controlling this Prior sentiment, we estimated the effect of controlling project-specific words through a sentiment proxy. By using the same proxy methodology for dependent control variables simultaneously, we could control for the impact of project-specific words and increase the reliability of the proxy methodology.

Crowdfunding funders are pre-purchaser who pay long before product implementation. Thus, a long delay in receiving the reward after the project launch can affect the overall satisfaction of the funder that has been waiting. We controlled for the

Delivery time, from the end of fundraising to receiving the reward in days. The Creator backed variable was used to control for social capital aspects of founder and is defined as the number of other projects on the platform that the founder has backed. Prior studies have shown that the fundraising duration has an influence on crowdfunding success (Mollick, 2014). By exploring the logical correlations, we can predict the impact on the satisfaction of the funder. Therefore, we controlled for Duration, which is the period of campaign that the project founder has set to raise funds in days. The number of words in project description makes investors understand the provider's vision and goal more precisely (Haas et al., 2015). Since the details of the project's contents can affect consumer satisfaction, we controlled for Description. At the founder's information sharing level, we controlled for the description details of the founder's bio through the Creator variable, since the founder information has potential impact on the funder's project understanding and final satisfaction. The Pledge Option is the number of different rewards offered to funders during fundraising campaigns. We included dummy variables for project categories, countries, and year that might affect the funder's sentiment.

4.3.5 Descriptive statistics

Table 1 reports the descriptive statistics of the sample data used in our model. Since the dependent variable Satisfaction had indirect proxy values rather than absolute satisfaction rate, the magnitude of the number had no precise meaning. However, the relative size was a good indicator. The overall project sentiment average before receiving

the product was 0.3577, but the average after receiving the reward decreased to 0.2972. The statistical results indicated that the overall satisfaction with the implemented product was not high. The average investment attraction for the 2,126 projects in our sample was USD 120,185, which was higher than prior studies using Kickstarter data (Belleflamme et al., 2014; Rollick, 2014), since our data included only projects that succeeded in funding and proceeded with the idea implementation stage. The average time to receive the implemented reward was 71.8181 days, and the average reward option was 10.5353 types per project.

Table 1 Descriptive statistics

Variable	Mean	Median	Std. dev.	25% Per.	75% Per.	Min	Max	N Obs.
Satisfaction	0.2972	0.2834	0.2091	0.1789	0.3939	-0.6776	0.9854	2126
Pledged	120185	38595	300419	12326	110483	200	6225355	2126
Experience	1.8979	0	3.7979	0	2	0	39	2126
Communication	39.2484	16	64.2492	4	48	0	851	2126
Visualization	12.7168	9	12.8306	3	19	0	93	2126
Prior Sentiment	0.3577	0.3486	0.1645	0.2564	0.4485	-0.4588	0.9612	2126
Delivery Time	71.8181	48.9709	79.1952	17.5956	102.0463	-31.0589	688.4099	2126
Creator Backed	11.0221	5	20.2896	1	12	0	269	2126
Duration	112.0427	66.8758	146.6763	45.9943	108.3511	5.0233	1480.788	2126
Description	988.1096	863	717.9162	453	1364	1	4332	2126
Creator	67.1143	80	29.0668	46	90	0	114	2126
Pledge option	10.5353	10	5.1360	7	13	1	64	2126

4.3.6 Empirical model

Dependent variable in the study has a continuous value between -1 and 1. By setting the value of neutral opinions of social media to 0, the mean of our data did not become

zero because the user comment was not centered on neutrality. Then we standardized the variables Delivery Time, Duration, Description, and Creator to ensure the model's reliability and reduce scale errors. However, after plotting and Shapiro-Wilk (S-W) testing the sample data, it is shown that the overall satisfaction distribution followed a normal distribution with the mean value at the center. We than suspected and tested error term normality from ordinary least square (OLS) regression model including all explanatory, control and dummy variables in the model. Due to the relatively large number of sample data, the normality test of the error term showed negative results. In the Jarque-Bera normality test, null hypothesis of normality has been rejected through a high J-B value. Cameron & Trivedi's decomposition of IM-test also indicated that there is a heteroskedasticity problem (with 90% significance) but without skewness problem (with 90% significance). To solve this problem and construct a suitable model, we made two separate attempts.

First, the Weighted Least Squares (WLS) model in the form of exponential weighted series was tested. The results of the IM-test, which was performed again in a exponential weight applied model using the same variable showed that the heteroskedasticity problem was much reduced (p=0.087). Based on the overall result of the test statistic, we concluded that this WLS model is with reliable results and adopted it for base model. Mean VIF value was 1.13, supporting our model reliability assumption.

$$\textbf{Satisfaction} = \beta_0 + \beta_1 * \boldsymbol{Pledged} + \beta_2 * \boldsymbol{Experience} + \beta_3 *$$

$$\boldsymbol{Communication} + \beta_4 * \boldsymbol{Visualization} \quad (1)$$

The dependent variable, Satisfaction, is located on the left side of equation (1), whereas four explanatory variables are located on the right side. Each variable notation and definition are shown in data section, with exponential weighted u representing the weighted error term of the WLS model.

Second, we conducted the 2SLS regression through our proposed instrument variable to estimate the same effect while controlling for the effects of funding uncertainty error term on crowdfunding. Specifically, we regressed the explanatory variable Pledged on the founder's set goal and all the control variables in equation (1) in the first stage. The project set point has often been addressed in previous studies in terms of fundraising influence (Mollick, 2014), but it is difficult to say that the setting directly affects satisfaction. Therefore, the 2SLS model with this instrument variable is expected to contribute to correcting the error term distribution problem due to the size of the project. The 2SLS model fits with statistical tests, we considered that Goal as reliable instrument variable. Thus, in the second stage, we replaced Pledged with the fitted value from the previous stage and re-estimated the equation.

$$\mathbf{Satisfaction}\,[\mathbf{stage2}] = \beta_0 + \beta_1 * \boldsymbol{Pledged}\,(\boldsymbol{instumented\ by\ Goal}[\boldsymbol{stage1}]) + \beta_2 * \boldsymbol{Communication} + \beta_3 * \boldsymbol{Experience} + \beta_4 * \boldsymbol{Visualization} \quad (2)$$

4.4 Results and Discussion

4.4.1 Empirical results

Table 2 presents the results for WLS model regression to test our hypotheses. The first column represents our baseline regression results without proposed explanatory variables. Model 1 includes only the variables, Pledged and Communication, to the baseline associated with the increase in the utilitarian value, which showed a significant positive correlation with the funder's satisfaction level, thus supporting H1 (β_1:positive, p<0.01) and H2 (β_2:positive, p<0.05). Model 2 includes only two explanatory variables to the baseline, Experience and Visualization, related to improving the hedonic value, which demonstrated a positive impact on funder satisfaction with high significant level, thus supporting H3 (β_3:positive, p<0.05) and H4 (β_4:positive, p<0.10). Model 3 is our full WLS model that includes all related variables, which showed also significant results for all explanatory variables, thus supporting all four hypotheses. Full model had adjusted R-squared value of 0.4577, and supported model significance (F<0.01).

Table 2 Result table for WLS

Satisfaction	Baseline	Model 1	Model 2	Model 3
Explanatory variables				
Pledged		3.65e-08***		3.10e-08***
		(1.15e-08)		(1.16e-08)
Experience		0.00235**		0.00263***
		(0.000930)		(0.000932)
Communication			0.000105**	9.61e-05*
			(5.21e-05)	(5.23e-05)
Visualization			0.000767**	0.000767**
			(0.000314)	(0.000316)
Control variables				
Prior Sentiment	0.841***	0.851***	0.851***	0.871***
	(0.0202)	(0.0204)	(0.0204)	(0.0211)
Delivery Time	-1.32e-09***	-1.29e-09***	-1.40e-09***	-0.0102***
	(4.82e-10)	(4.86e-10)	(4.82e-10)	(0.00349)
Creator Backed	0.000181	8.95e-05	0.000166	9.13e-05
	(0.000166)	(0.000167)	(0.000165)	(0.000169)
Duration	2.85e-10	3.30e-10	1.55e-10	2.24e-10
	(2.60e-10)	(2.61e-10)	(2.63e-10)	(2.72e-10)
Description	-2.48e-07	-1.31e-06	-6.67e-06	-7.62e-06
	(4.74e-06)	(4.73e-06)	(5.32e-06)	(5.32e-06)
Creator	0.000359	-9.76e-05	-2.62e-05	-5.25e-05
	(0.000663)	(0.000691)	(0.000671)	(0.000114)
Pledge Option	-3.41e-05	-5.95e-05	-2.64e-05	-5.25e-05
	(0.000114)	(0.000114)	(0.000114)	(0.000114)
	0.000359	-9.76e-05	-2.62e-05	-0.000355
Constant	-0.0106	-0.0146	-0.00923	-0.0139
	(0.0230)	(0.0231)	(0.0231)	(0.0231)
Observations	2,126	2,126	2,126	2,126
R-squared	0.4548	0.4559	0.4578	0.4615
Adj R-squared	0.4520	0.4555	0.4544	0.4577
F statistics	160.32	137.77	137.16	120.58
Prob > F	0.0000	0.0000	0.0000	0.0000

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 3 compares the results of the WLS and 2SLS regression analyses testing our proposed hypotheses. The first column shows results of WLS model (Model 3 from Table 2), whereas the second column shows results of the 2SLS regression after estimating coefficients with the instrument variable, Goal. In comparison, the marginal effect using

coefficient estimates on the instrument variable Pledge (β_1=5.25e-08, p<0.05) was slightly more positive and significant at the 5% level. For all explanatory variables, the results supported our hypotheses with a good significant level as with WLS results. The coefficients of Communication (β_3=9.15e-05, p<0.10) and Visualization (β_4=0.000743, p<0.01) decreased slightly, while the coefficient of Experience (β_2=0.00264, p<0.01) increased slightly and replaced the gap.

Table 3 Result table comparing WLS and 2SLS

Satisfaction	WLS	2SLS
Explanatory variables		
Pledged	3.10e-08***	5.25e-08**
	(1.16e-08)	(2.25e-08)
Experience	0.00263***	0.00264***
	(0.000932)	(0.000932)
Communication	9.88e-05*	9.15e-05*
	(5.47e-05)	(5.55e-05)
Visualization	0.000775**	0.000743**
	(0.000330)	(0.000333)
Control variables		
Prior Sentiment	0.859***	0.865***
	(0.0205)	(0.0210)
Delivery Time	-1.33e-09***	-1.40e-09***
	(4.85e-10)	(4.88e-10)
Creator Backed	6.99e-05	6.53e-05
	(0.000167)	(0.000167)
Duration	2.11e-10	2.21e-10
	(2.63e-10)	(2.63e-10)
Description	-7.62e-06	-7.54e-06
	(5.32e-06)	(5.31e-06)
Creator	-5.25e-05	-6.01e-05
	(0.000114)	(0.000114)
Pledge Option	-0.000355	-0.000655
	(0.000694)	(0.000752)
Constant	-0.0139	-0.0101
	(0.0231)	(0.148)
Observations	2,126	2,126
R-squared	0.457	0.456
Adj R-squared	0.4577	0.4573
F statistics	120.58	150.38
Prob > F	0.0000	0.0000

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

4.4.2 Discussion

Although most previous crowdfunding studies have focused on strategies for funding success, with some being interested in performance after funding. What happens after pledge attraction in the reward model is to actually implement the product and provide it to funders, which dramatically represents the early-customer testing nature of this online platform. This is why it is crucial to explore the process of creating funder satisfaction after fundraising success to look at crowdfunding as an intermediate medium leading to competitive innovations. Although there has been interest in these needs, due to methodological limitations, mainstream crowdfunding studies were mainly concerned with in-direct satisfaction with the product. In addition, academic considerations on the process beyond demonstrating the correlation are insufficient. Therefore, this study investigates central mechanism and the factors that affect satisfaction after crowdfunding projects' fundraising success to fill that research gap.

In this study, the process of funder satisfaction was analyzed with proposed framework which considered the two-sided characteristics of crowdfunding and combined the theories of consumer research and innovation process research. The framework understood funder satisfaction process as a combination of the shopping experience and indirect entrepreneurs' idea implementation capacity. Funders participate in crowdfunding to quickly receive novel idea products and enjoy the pleasure of participating in the innovative process. The study conducted an analysis of the factors influencing the entrepreneur capacity to provide funders with utilitarian values through successful

functional implementation. Then, the study found the factors to explain the process of achieving perceived psychological satisfaction with hedonic values.

First, a funder can experience a utilitarian value depending on whether the product provides basic functionality that funders expected while making funding decision, which is the consumer aspect of crowdfunding participation. By making an funding based on only the proposal of a novel idea, the funder is a consumer who makes a purchase decision before an idea is realized. Therefore, whether a product has practical functionality depends on success of the idea implementation. In the process of realizing an idea, a strategic capacity is required to overcome numerous uncertainties and difficulties (Perry-Smith & Mannucci, 2017) and how well the founder can deal with these uncertainties and external circumstances can create this utilitarian value.

Our empirical results confirm that projects with more funds have a significant impact on providing satisfaction through the utilitarian value. The result show that funding success due to high expectations and securing an oversubscribed budget is also helpful in terms of realizing the idea. In projects with high level of funding, the process of changing funders' sentiment from positive to more positive can be examined from our results. Second empirical analysis, which examined the impact of the founder's experience on the overall funder satisfaction after receiving the product, showed that human capital influence funding success. This phenomenon is due to the funder’s belief of the founder's ability to implement the idea successfully (Mollick, 2014), and shows that human capital certainly acts as a capability for implementing ideas, as expected by funders. By exploring the two

capacities in the process of delivering the utilitarian value by successfully implementing an idea, we obtain a deeper understanding of the process of creating innovation through entrepreneurial implementing.

Second, the hedonic value a funder can experience is somewhat different from functional satisfaction. The hedonic value comes from multisensory, personal fantasy and emotive aspects of the funding experience, which is mainly the indirect innovator aspect of crowdfunding participation. Funding participants value not only purchasing products, but also indirectly participating in the creative innovation process. By understanding the characteristics of the funder, the project founder should also pay attention to delivering the hedonic value that creates the emotional satisfaction of the funder. Beyond simply making a well-functioning product, making them feel how involved they are in the project even if they pay the same amount of money is an important factor in realizing overall funder satisfaction. Our analysis revealed that active communication positively significantly affected the overall funder satisfaction. Through active participation, the funder's opinions were reflected resulting in positive implementation feedback, and participation and attachment arise. Active participation provides emotional pleasure. In addition, it positively influences satisfaction by enhancing the funder's attachment to the project and intimacy with the entrepreneurs. Founders may use information imbalance strategically to attract investment or sell their products (Courtney et al., 2017). However, in the post-crowdfunding situation, such an imbalance can create a misunderstanding with consumers. In addition, emotional delivery of this information imbalance greatly hurts the attachment

of the funder to the project itself. The empirical results show that proper idea visualization in the stage of proposing idea makes funder more emotionally attached to the project, forming trust in the founder, which in turn increases the level of attachment throughout the project cycle. When it comes to continuing innovation perspective of crowdfunding, not only fundraising, clear and precise information sharing between the founders and funders enhances their mutual understanding with respect to the project plan. This suggests that it is advantageous to secure long-term competitiveness by making funders actively participate rather than considering them as just capital providers.

4.5 Conclusion

Our study highlights the role of crowdfunding as an intermediate process of innovation and the intention to participate as an indirect innovator of the funder. The two-sided nature of crowdfunding participants participating in the reward model has been mentioned in several crowdfunding studies, however this study demonstrates that this affects the ultimate after-fundraising satisfaction to the extent that the founder has to consider it practically. After a crowdfunding project is completed, the response of the initial consumer becomes a long-term competitive advantage of the business. A good initial market response translates into several positive retail variables: customer share, support, and long-term sales increase (Babin & Attaway, 2000; Stoel et al., 2004). Therefore, this study investigates the factors and mechanism that makes after-crowdfunding satisfaction through the hedonic-utilitarian value delivery framework, a concept borrowed from

customer theory, to explores the critical elements of entrepreneurship that affect the development of an idea into a company with a competitive edge.

This study contributes to the literature by presenting a two-factor crowdfunding satisfaction framework for achieving investor satisfaction that goes beyond successful idea's functional implementation and enhancing the product quality. Thus, entrepreneurs should note that funders who participate in the special environment of crowdfunding value the emotional happiness of participating in innovation. Additionally, resolving information imbalances is also an essential factor for entrepreneurs for further business development. In terms of subsequent business development, it is necessary to focus on value delivery for both sides. Crowdfunding plays a critical role in the early stages of the innovation process and is the starting point for successful ventures in the later stages. Reward-based crowdfunding still shows many shortcomings; however, the possibility of development is endless if research continues to discern innovation factors.

4.5.1 Limitations and further studies

This study has some limitations. First, measuring the satisfaction of the funders through comment sentiment is a somewhat limited approach. Although the use of computation-based proxy methods through semantic analysis went full-enough reliability test in computer science fields and is suitable for the purpose of this study, the measured value may not accurately reflect the satisfaction of all funders. For instance, intentional intervention of some participants may be included in the sample text. In addition, the time

of product delivery is estimated through the seller's reward setting and update notification, which is an effective method for estimating the reactions of a large number of participants that are difficult to obtain by questionnaires. However, this method might not be accurate, since the platform has no confirmation alert when the individual consumer receives the reward. Future work can overcome this problem by filtering out trash text more accurately, or by constructing better delivery forecasting models. Additionally, administering supplementary surveys to funders can sharpen the results.

Second, since many complex psychological factors influence funder satisfaction, the process of creating satisfaction might have much more complexity than can be addressed through our proposed framework. According to the satisfaction two-factor theory (Chowdhary & Prakash, 2005), dissatisfaction resulting from a shortcoming in basic conditions is examined separately from non-satisfaction. However, in our framework, complaints and applauses from comment sentiment are classified as one axis. With two-factor classification, follow-up studies can predict the performance of a company in the future based on the indicators of emotional satisfaction and complaints about functional requirements. Moreover, in-depth interviews with funders may improve the model. Finally, crowdfunding deals with the problem of choice between ideas in the innovation process. However, our study presents a framework for the idea implementation stage after being selected by investors. Therefore, future research can build on this study to investigate the competitiveness of innovative companies developed from crowdfunding projects.

Chapter 5. Subsequent funding of crowdfunded startups: Focusing on factors affecting follow-up funding amount and timing

Abstract

Crowdfunding provides timely fundraising opportunities to entrepreneurs, which are vital for the development of creative ideas into innovation. A successful crowdfunding project is regarded as a positive foundation for implementation funds, help attracting funds at a later stage and developing the business further. This research explores the subsequent entrepreneurial financing of crowdfunded projects by analyzing the factors influencing the funding performance of timing and amount of funds that crowdfunded startups secured at the later stages. We explore specific determinants from crowdfunding process that influence startup's follow-up fundraising performance. We apply a text-matching technique on cross-platform text data to construct a dataset of reward-based crowdfunded projects with follow-up venture capital investment. Empirical results show that market expectation promotes amount of funding and slower urgent follow-up funding, while securing market satisfaction leads to better amount on follow-up investments. However excessive negative reviews from crowdfunding platform harms startup survival and shortens time until follow-up VC financing. Proactive partnership is positively related to fundraising amount performance. Therefore, entrepreneurs are encouraged to make active communication attempts to strategically establish good formal investor partnerships from the outset, which is advantageous for value assessment.

Keywords: crowdfunding; follow-up funding; entrepreneurial finance; venture capital; market uncertainty

5.1 Introduction

Timely entrepreneurial fundraising is vital for the development of creative ideas into successful innovation. Academic research on fast-growing enterprises initially focused on formal venture capital (Drover et al., 2017) but later extended to a variety of new funding entities and methods (e.g., Kotha & George, 2012; Maxwell, Jeffrey, & Lévesque, 2011; Mollick, 2013). Online reward-based crowdfunding, in which online crowds receive proposals and invest in a founder's plans to realize a novel idea, is one such funding method that has attracted practical and academic interest among new capital providers (Belleflamme, Lambert, & Schwienbacher, 2014). The emergence of such a new funding platform has shifted the paradigm from a small number of expert-oriented investment decisions to non-professional public's investment decisions (Meyskens & Bird, 2015). Moreover, the fact that crowdfunding not only provides funds to founders, but also reflects the market response at the same time, makes it an attractive research topic. Therefore, a successful crowdfunding project is regarded as a positive foundation for attracting funds at a later stage, developing the business, and attracting single-shot implementation funds; however, the financing pathway after crowdfunding is still mostly unexplored (Short et al., 2017).

While multiple studies have addressed the factors of funding success on crowdfunding platforms, it has been challenging to determine what steps have been taken by the founders to develop their businesses further after securing funds. From the financing-stage approach, it is unclear how crowdfunded startups attract subsequent

venture capital investments and expand their business after the release of the initial prototype. In addition, there needs to be more discussion about startup survival after crowd-based financing. The study argues that the crowdfunding process not only gives direct financial support but also significantly impacts the subsequent financing and startup growth pathways. Intricacies in tracking the later stages of crowdfunded projects are the limitations that make empirical research in this field challenging. We address this issue using a text-matching technique and construct a unique dataset for an in-depth analysis of business expansion after crowdfunding success.

This paper proposes an original framework for how crowd-fundraising campaigns and post-crowdfunding implementation processes influence the attractiveness of ventures at later stages of business development, focusing on three non-financial aspects of crowdfunding, securing market expectation on fundraising, securing post-crowdfunding satisfaction/dissatisfaction and relationship building with investors. A crowd's early investment decision reflects the market expectation of idea concept, which provides rapid capital, the founder's self-affirmation of their idea, and primary market signals to more investors. Meanwhile, following the idea implementation stage, securing market satisfaction—if the crowdfunding participants express satisfaction with the product they received—will provide a more robust market signal to additional investors and lead the venture-stage progress. As an indicator of the crowdfunded venture's subsequent growth pattern, we investigated the fundraising performance in the amount of subsequent funding and further business' survival in the financing market.

For empirical analysis, we constructed an original dataset using Crunchbase's investment announcement data, text data from online media, and Kickstarter.com project description text to match whether the startup's core products originated from crowdfunding. After model reliability verification, our hypotheses were tested by performing a multi-model regression including ordinary least squared (OLS), Tobit, and Negative binomial regression.

We demonstrate the financial path of crowdfunded projects by examining follow-up investments to emphasize entrepreneurial value of the crowdfunding. The results of the crowdfunding and post-crowdfunding implementation process provided significant feedback to subsequent venture investors and market. This result identifies the value-add from non-financial benefits that can be obtained when a founder chooses to pursue crowdfunding in the early entrepreneurial fund attraction process. We suggest that entrepreneurs should pay attention not only to attracting funds through crowdfunding but also to ensuring quality idea implementation while collaborating with capital investors. Efforts to minimize negative dissatisfaction must be made in parallel for the long-term survival of startups. Based on the results, practical advice is provided to entrepreneurs who are considering crowdfunding as an early-stage capital provider and those seeking further business developments. In addition, this study makes a methodological contribution to the literature through adopting semantic analysis with natural language processing. In the process of integrating different stages of investment attraction data, a text-matching algorithm to build a meritorious dataset is also presented.

5.2 Theoretical framework and hypotheses

5.2.1 Crowdfunding as entrepreneurial financing

Cumming (2012) defines entrepreneurial finance research as work that covers sources of innovation-related capital such as business angels, venture capital, hedge funds, and project finance. Entrepreneurial finance markets have developed significantly over the last 30 years. The leading players of this market are formal funding agents, such as venture capitalists, which can be classified as institutional financers by investment experts (Bruton et al., 2015; Gompers, 1994). However, this is a dynamic field in which new players, such as accelerators and crowdfunders, continuously emerge and converge (Drover et al., 2017).

Crowdfunding is the attraction of funds from large external communities as a way for new businesses to fill the early-stage funding gap (Collins & Pierrakis, 2012). The expansion of online crowdfunding platforms has begun to have a significant impact across the entrepreneurial finance ecosystem. Crowdfunding research has gained traction throughout the present decade as a new influential initial-investment tool in the entrepreneurial finance field. Researchers have argued that the speed, flexibility, and market testing features of crowdfunding, as well as its ability to signal further markets are extra motivation for entrepreneurs to choose this method (Hienerth & Riar, 2013). Through this, it was considered that crowdfunding not only reduces the funding gap, but also has a long-term value-adding effect on businesses (Macht & Weatherston, 2014; Belleflamme, Lambert, & Schwienbacher, 2014). Drover, Wood, & Zacharakis (2017) classified crowdfunding into four types. Among them is reward-based crowdfunding, which is an

unusual form whereby the funder does not invest in equity but acts as a pre-purchaser of a proposed idea-based product (Belleflamme, Lambert, & Schwienbacher, 2014). The special nature of this type of investment raises the value of crowdfunding beyond mere financial support. Testing market reactions, signaling later markets, and mass public exposure facilitates access to further funding and business expansion (Macht & Weatherston, 2014).

Meanwhile, crowdfunding research is redirecting its attention to the next step, post-crowdfunding. Research on the emergence of this new funding sources was initially isolated, but gradually, interconnectedness among funding sources became a valuable landscape for researchers (Drover et al., 2017). Literature has examined friend-or-foe relationships between capital providers (Hellmann & Thiele, 2015), co-opetition (Gnyawali & Park, 2011), and the effects of accelerators on follow-up venture capital (Hochberg & Fehder, 2015) as part of entrepreneurial financing literature expansion. Venture development has also made it important to research follow-up business expansion after crowdfunding. Signals given by earlier-stage funding are generally known to be positive (Ahlers et al., 2015); however, detailed determinants and mechanisms largely remain unexplored.

Crowdfunding has received much attention from the startup ecosystem both in research and practice (Antonenko, Lee, & Kleinheksel, 2014; Bruton et al., 2015; Mollick, 2014), but still there are questions about whether it is used as a one-off funding method for production. Indeed, little research has been undertaken to observe whether crowdfunding

can serve as a cornerstone for building long-term innovative startups. Reward-based crowdfunding is a fund attraction focused on the realization of initial products. Therefore, timely follow-up financing is required for the development of next-step expansion and survival of the businesses. Exploring the path and characteristics of such subsequent funding is vital in gaining an in-depth understanding of crowdfunding. In reality, statistics show that most crowdfunded projects do not lead to further business developments and that the tracking of post-crowdfunding future business progress is challenging. Only a few crowdfunded projects have expanded into successful companies through follow-up venture funding. Chang, Lee and Tien (2021) showed that the existing investment relationship with venture capital has a positive effect on subsequent crowdfunding. Hu, Jin & Keppo (2020) looked at venture capital reactions that depend on crowdfunding results. In particular, venture capital firms update their assessments of project based on information collected from crowdfunding platform. Troise et al. (2022) investigated the role of crowdfunding in a resource based view is compensating for lack of knowledge relevant to internationalization process. Thies et al. (2020) and Bessière et al. (2020) dealt with the syndication of venture capital and crowdfunding based on signaling theory. Especially, Babich, Marinesi & Tsoukalas (2021) dealt with the effect of attracting venture investment when crowdfunding was preceded. Looking at what characteristics of the crowdfunding process make the characteristics of later stages of startups' development could provide insight about the entrepreneurial value of crowdfunding.

5.2.2 Venture financing performance: amount and timing

In the process of developing creative ideas into successful innovations, the timely and sequential financing plays a vital role in driving its growth. In the entrepreneurial process, where the business environment changes rapidly and contains much uncertainty, this funding typically goes through several separate stages (Grenadier & Malenko, 2011; Li, 2008; Tian, 2011). Investors usually hedge investment risks and strive for the best results at every moment through stage-based funding. From the perspective of a growing company, securing sufficient serial funds that continuously match the stages of growth is essential for long-term survival.

Therefore, in entrepreneurial funding, financing case's amount, valuation, sequential timing, and funding source are crucial research interests that can affect venture success and survival. Early accelerators, business angels, and formal venture capitalists usually feature at specific stages of investment and tend to interact with each other. Schwienbacher (2009) analyzed business angels and formal venture capitalists in terms of value-adding activities by each venture phases. In particular, the effect of the investment entity in the previous stage on follow-up investment has been analyzed (Grenadier & Malenko, 2011). Researchers have mainly discussed continued financing considering the option theories or contractual mechanisms (Arcot, 2014; Bengtsson, 2011; Hellmann, 2006). While dealing with joint investment networks and syndication of investments (Bonnet & Wirtz, 2012; Chahine, Filatotchev, and Wright, 2007; Dutta & Folta, 2016; Elitzur & Gavious, 2003; Goldfarb et al., 2013), there is an active academic discussion on the determinants of serial

financing and venture survival through subsequent financial attraction.

5.2.3 Research framework

We focus on startups that have been able to attract follow-up funding after reward-based crowdfunding success. The study examines the timing of follow-up startup's fundraising in traditional financing market and the amount of financial resource acquired after crowdfunding depending on the characteristics in crowdfunding process. In the framework, the characteristics that can appear before, during, and after crowdfunding are set in three different determinants. The first and second includes characteristics that appear from the feedback-providing aspect. Specifically, these characteristics entail (1) whether the novel idea secures the market's expectations on the fundraising campaign and (2) whether the implemented prototype secures the market's satisfaction/dissatisfaction on post-crowdfunding delivery. The third characteristics are forming relationships with investors before crowdfunding process begins. Specifically, we consider whether the founder has a proactive relationship with their formal capital provider might affect further venture financing performance. Figure 1 summarizes the hypotheses of this study.

Figure 1 above summarizes the hypotheses of this study.

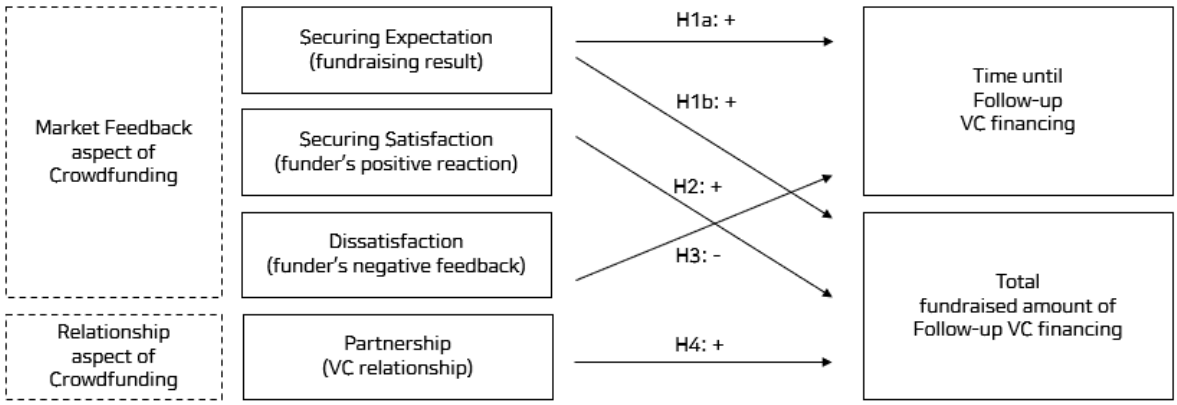


Figure 1 *Research model*

5.2.4 Feedback aspect and follow-up financing

5.2.4.1 Securing market expectation

Reward-based crowdfunding is not just about financial resource acquisition. It also represents a place to test the early attention to and demand for the proposed ideas (Burtch, Ghose, & Wattal, 2013). Receiving funding decisions for proposals from crowd investors represents expectation levels in the market. Thus, in some cases, the success of a crowdfunding campaign is treated as an initial market success (Kuti & Madarász, 2014). Here, we take a closer look at this type of early market success, considering it as the success of a product concept rather than as market performance after the completion of implementation. Successfully securing reward-based funds indicates the success of securing early expectation on the concept.

The success of initial funding leaves the project founder with the funds to design and produce initial products. MacMillan, Zemann, & Subbanarasimha (1987) highlighted

insufficient market-staying power as a crucial failure factor for venture-backed firms, via research on venture capitalists' firm selection. Startups continue to need additional funding as they grow, but the campaign success frees up this initial portion for a specified period. As a result, capital from crowdfunding lowers the need for immediate subsequent investment and allows founders to focus on business development. Moreover, the purpose of funding after crowdfunding success becomes different. Startups' reasons for seeking funds vary by the size and perceived stage of growth (Ruhnka & Young, 1991). Formal venture capital differs at specialized stages with the level of funds divided accordingly, and as the business environment becomes complicated, the stages are further divided (Norton & Tenenbaum, 1993). Insufficient funds force founders to pursue bridge finance, particularly if the level of business development required to meet the purpose of the next stage has not been reached. Meanwhile, since crowdfunding success secures market expectation, it immediately supplies the initial production funds, thereby reducing the urgent need for bridge funding. Founders do not need to hurry on strategically unmatured option until they receive a high-valuation investment proposal if they already have enough money to commence the production process. On the other hand, the non-financial feedback that comes with successful crowdfunding also corroborates that entrepreneurs; ideas have received positive responses in the market (Gerber et al., 2012). Thus, the level of campaign success influences the venture's long-term survival rate and affects the funding choices to pursue at a later stage.

Conversely, from an investor's viewpoint, identifying a high level of market

expectation is a meaningful signal from the market. Gompers et al. (2008) argued that institutional investors with substantial experience are more susceptible to market signals. MacMillan, Siegel, & Narasimha (1985) proposed six criteria for assessing the risk of an investment opportunity, in which significant risk is the failure of an investment due to market response. Venture investment is an investment decision that takes into account great uncertainty. In the early phase of the venture, market uncertainty has to be calculated as high by investing institutions. These low expectations are a prominent reason that venture capitalists provide conservative valuations. Investors analyze market success based on their insights and methods, but they do not always know the correct answer. This conservative view is aimed at defending against the loss of capital due to the risk of market failure. In this situation, a business idea that has already secured market expectation has absolute competitiveness. Investors can be favorable when evaluating corporate value, confirming that consumers are keenly interested in the product idea and express willingness to purchase.

Moreover, firms that have gained public attention through online crowdfunding platforms can be exposed to multiple venture capitalists. Prior studies highlighted the crowdfunding value in terms of the accessibility aspect (Mollick & Kuppuswamy, 2014) and its ability to signal subsequent markets (Hienerth & Riar, 2013). Broad investor contact can be considered an additional effect of crowdfunding (Macht & Weatherston, 2014), helping startups secure better strategic positions in subsequent investment negotiations. Diverse investors can observe the existence of the project through the open platform and

consider it as a potential investment target. This can increase the startup's contact exposure with capital providers (Thies et al., 2019), increasing the chance of favorable valuation.

From these perspectives, securing market expectation is expected to have a significant effect on both market strength and firm valuation of follow-up funding. Hence, we hypothesize as follows.

H1a: Crowdfunding success has a positive effect on time to next-round venture financing.

H1b: Crowdfunding success has a positive effect on the amount of follow-up venture financing.

5.2.4.2 Securing market satisfaction/dissatisfaction

Most crowdfunding studies have treated fundraising success as a vital dependency result (Belleflamme, Lambert, & Schwienbacher, 2010; Mollick, 2014). This is because an entrepreneur's primary purpose for pursuing crowdfunding is to raise initial capital. Due to limited access to further business development, few studies have focused on how and when products are delivered after the fundraising campaign (Chemla & Tinn, 2019; Mollick & Kuppuswamy, 2014).

For a crowd investor, accessing and investing in newly proposed ideas on crowdfunding platforms carries critical risks. For example, it can take considerable time for the proposed product idea to be completed and delivered. Therefore, to attract investment, founders often portray their ideas to be as advantageous as possible, and there

may be limits and compromises during the product development process that are not initially considered even by founders. As a result, crowdfunding participants often find that their expectations were not met after receiving the products and therefore, complain about the crowdfunding platform system as a whole. This reaction refers to the initial market response to realized products, which is different from the market expectation of the novel idea concept. Accordingly, the satisfaction level of the funder after receiving a product indicates a more meaningful market signal. Funder sentiment shows whether the entrepreneur succeeded in securing the satisfaction of the early-stage market.

The satisfaction of the early purchaser is a vast step forward in mass-market success. It means that the project has successfully achieved idea implementation quality. Since startups have already overcome many uncertainties and difficulties that may arise in the process of realizing ideas (MacMillan, Siegel, and Narasimha, 1985), it signals the removal of important uncertainties in the capital providers' investment decision-making process. MacMillan, Zemann, & Subbanarasimha (1987) argued that failures in the prototype implementation stage are a critical factor leading to the failure of formal venture capital-backed startups. Other entrepreneurial investment studies also considered the market acceptance of a product to be key to the success of new ventures (Ruhnka & Young, 1991; Tyebjee & Bruno, 1984). Venture capitalists cannot fully anticipate the market's response to the product or the product's quality (Fitza, Matusik, & Mosakowski, 2009), which would add high value to startups after quality assurance. As a result, startups that secure early market product acceptance can be recognized as having higher corporate value.

However, negative disconfirmation makes dissatisfaction of funders, which usually go through negative word-of-mouth public comments, harms brand loyalty. However, the expression of aggressive dissatisfaction has a different effect than failing to elicit a positive response. In a crowdfunding context, this means that survival from direct revenue in the future may be difficult. Distrust about products and companies in the market also hinders subsequent VC funding itself. However, apart from this, it is an incentive for founders to seek rapid follow-up changes. As a result, the more people who actively express negative views at the time of receiving the product, the faster the founder are looking for further capital provider to survive.

Accordingly, when examining the follow-up funding, securing market satisfaction with positive comments primarily affects the amount, however, negative feedback from dissatisfied early customers harm startup's survival through revenue and hence accelerated fast-seeking of follow-on funds. Hence, we hypothesize as follows.

H2: Securing market satisfaction on post-crowdfunding delivery has a positive effect on financing amount in follow-up venture funding.

H3: Market dissatisfaction on post-crowdfunding delivery has a negative effect on time to next-round venture financing.

5.2.5 Relationships with investors and follow-up funding

As startup ecosystems developed, an entity known as "accelerators" emerged as an early form of capital provider. Accelerators do not just make financial investments; they

are more active capitalists that work together as partners in the startup process to help build and structure new businesses (Cohen & Hochberg, 2014; Hallen, Bingham, & Cohen, 2014). As with venture capitalists, crowdfunding reduces the accelerators' burden and risk. Rather than investing directly toward the entire production process, the main cost can be funded through crowdfunding. Accelerators help entrepreneurs prepare for fundraising while providing limited buildup funds and waiting for public funding. They transfer their management and funding expertise, and strive to create a situation in which they can bring products to the market successfully, with minimal investment risks. We consider this preliminary preparation network as a crucial characteristic affecting the growth of a company after its successful crowdfunding campaign. Specifically, building relationships with strategic investors from the pre-crowdfunding stage helps the firm's future growth.

Investors often make network decisions rather than number decisions. Collaboration and mutual impact of various finance sources are the main focus addressing investor networks (Bygrave, 1988; Hochberg, Ljungqvist, & Lu, 2007; Lerner, 1994; Sorenson & Stuart, 2001; Walske, Zacharakis, & Smith-Doerr, 2007). Hochberg, Ljungqvist, & Lu (2007) addressed the importance of prior venture capitalists working together in the subsequent funding of the companies that they invested in, with venture capitalists' networks showing a positive effect in the process. Casamatta & Haritchabalet (2007) evaluated post-investment valuation growth depending on a prior financing network, and showed that syndication of capital providers reduces the cost of information gathering. As such, the experience of existing cooperative investment increases the probability of

subsequent reinvestment (Chemmanur & Tian, 2019), and securing the value of subsequent investments has been discussed as an essential role of the leading investor (Gorman & Sahlman, 1989).

In addition, the effect of diminishing perceived risk by intimacy makes prior funding experience valuable. Intimacy between the firm and capital provider has a positive impact on corporate value estimation by investors. The established relationship between the two, along with effective information transfer, gives the capitalist a lower level of perceived uncertainty about the company's business. Founders may actively form intimacy to convince investors and can draw reasonable valuations from investors who have built up higher affinity (Gompers et al., 2008). Therefore, the amount of information that a capital provider gathers about the target firm and entrepreneur throughout the initial relationship, and the additional private information transfer results in a higher probability of repeated and value-added post-investment. Moreover, capitalists' expertise transfers positively affect post-crowdfunding subsequent funding preparation. Expertise in the company development process and future investment negotiations help the company's valuation to surge. The role of a leading investor is not simply to provide funds but also to contribute directly to business progress in later stages, pursuing a successful financial exit. Hence, we hypothesize as follows.

H4: Partnership with the capital provider before a crowdfunding process has a positive effect financing amount in follow-up venture funding.

5.3 Data and method

5.3.1 Data sources

We used web-crawled, publicly available investment announcement data, and online news data, then joined these datasets with crowdfunding project data for the empirical analysis. To explore the descriptive characteristics and results of the focal crowdfunding projects, we first crawled the campaign data of the largest reward-based crowdfunding platform, Kickstarter.com. As of 2019, more than 300,000 projects had been listed on it since its launch in 2009, and has become the most popular reward-based crowdfunding platform. Numerous studies have used this platform's project data to reveal the characteristics of reward-based crowdfunding (e.g., Mollick, 2014; Kuppuswamy & Bayus, 2017). This platform is also the most actively related medium to follow-up funding for early startups. As a result, we collected project meta-data from the launching phase, funding result data, information updates during and after the fundraising campaign, and communication information for 188,718 independent projects until 2019.

To identify companies that have successfully attracted follow-up venture investments after successful crowdfunding, we obtained funding announcement data from Crunchbase.com between January 2014 and October 2019. Among them, companies that mentioned crowdfunding in the public information were classified into the first candidate group. For other companies, we collected the company name, product name, representative name, and product launch time from the crowdfunding campaign page and organized them into the second candidate group.

We required a process to link companies with venture investments that matched the crowdfunded project data collected earlier. For companies listed as the first candidate group, we first looked at the related projects in media announcements about their crowdfunding success. The remaining companies and those in the second candidate group were grouped into a list of unmatched companies. The firm names, product names, and CEO information of unmatched companies in the venture investment announcement list were text-matched with the source of crowdfunding projects crawled above. As a result, if a crowdfunding campaign that was terminated before the traditional investment announcement was matched, we compared the time of the product launch to confirm the relationship. Of the 312 projects that were finally matched, a final 110 companies were selected by hand analysis to determine that the crowdfunded product was the main business item associated with later stages of expansion and investment.

5.3.2 Descriptive statistics

Our final analytical sample data comprised 110 unique crowdfunded companies over the period April 2009 to December 2018. We observed a total of 3,846 related information updates and 188,376 comments posted by funders and founders throughout the campaigns. Regarding the crowdfunding result, nearly 71 million US dollars were pledged for 110 projects in total. This final fundraising amount is 6.29 times higher than the sum of the initial fundraising goal of all the projects. The rate is much higher than the rate of the entire population, suggesting that crowdfunding tends to attract follow-up investment. In

accordance with our sampling rules, all 110 companies succeeded in bringing venture investments and disclosed their fundraising valuations at the time of investment. They brought a total investment of 2.14 billion US dollars through 298 follow-up fundraising events. Initial user satisfaction proxied by sentiment analysis of user comments was expressed as a continuous variable following a normal distribution. Detailed statistics for the variables are shown in Table 1.

Table 1 Descriptive statistics

Variable	Mean	Median	Std. dev.	25%Per.	75%Per.	Min	Max	N Obs.
lnAmount	14.4536	14.3213	1.9970	11.5129	18.4106	10.4736	20.7137	110
Time to Follow-up	800.67	715.5	538.78	343	1096	19	2568	110
lnPledged	12.4943	12.4246	1.3178	11.5992	13.3469	9.7997	15.9669	110
Satisfaction	0	-0.3020	1	-0.3819	-0.1042	-0.4254	6.8853	110
Dissatisfaction	1712.51	497	4025.48	175	1293	0	29429	110
Communication	1712.51	497	4025.48	175	1293	0	29429	110
Partnership	0.7909	1	0.9683	0	1	0	4	110
Human Capital	0.5182	0	1.0112	0	0	0	5	110
Social Capital	11.2455	5	16.1474	2	15	0	96	110
Progress Updates	1.6545	1	2.6351	0	2	0	16	110
New Updates	0.5909	0	1.0163	0	1	0	5	110
Visual Description	12.3636	4.5	16.1181	0	26	0	53	110

No critical correlations between measures were found in the correlation test conducted to explore the collinearity problem before model validation. The variance inflation factor test to cope with potential multicollinearity problems showed a reassuringly low mean value of 1.34.

5.3.3 Dependent and explanatory variables

The first dependent variable we used to test Hypotheses 1a and 3 is Time to Follow-

up, which is the number of days from the completion of the crowdfunding campaign to the latest disclosure announcement of the follow-up investment. Each piece of investment duration information was measured by calculating the difference between the recorded campaign closing date and the investment announcement date of the focal company. For the second dependent variable of our empirical analysis of Hypotheses 1b, 2, and 4, we used lnAmount, which is the natural logarithm of the investment amount in US dollar mentioned by the venture capital in the investment case announcement.

We used lnPledged as an explanatory variable for Hypotheses 1a and 1b to observe whether a company's proposed idea description achieved the initial market expectations during crowd fundraising. lnPledged is the natural logarithm of the total amount of money invested by the crowds in US dollars.

The explanatory variables in Hypothesis 2, Satisfaction, was used to observe whether the company's product satisfies the participants. To proxy this concept, we utilized the project funder sentiment from comments obtained from the crowdfunding platform. Online reward-based crowdfunding platforms allow funders to leave comments on the project page after their investment and after receiving the final reward. We collected comments after each campaign's reward products were delivered to funders after idea implementation ended. We performed semantic analysis using natural language processing techniques on the reviews of the received rewards left by the funders. We used Python NLTK VADAR, a natural language analysis framework for semantic analysis specialized in opinion mining of social media comments (Hutto & Gilbert, 2014). Each comment was measured by

quantifying whether it contains positive or negative expressions about the product. The degree of positive and negative evaluation of the product was measured as a continuous variable between 1 and 1, following compound results from the framework. The standardized value was used as the explanatory variable Satisfaction.

The third explanatory variable, Dissatisfaction, was to measure how active dissatisfaction expression was done by participants after product delivery. We counted negative categorized comments, which had more than 0.3 negativity score on VADAR (Hutto & Gilbert, 2014). This is to measure the degree of dissatisfaction activity by measuring how many people have expressed strong negative views after receiving the product, apart from the positive level in the overall community.

The fourth and final explanatory variable, Partnership, is the number of times the founder received investment from a venture investor prior to posting the crowdfunding project campaign online. This variable is used to observe whether strategic, financial investors were preparing for funding campaigns together or at least had formed a relationship with the entrepreneur before the project was launched.

Table 2 summarizes the theoretical concepts and proxies of hypotheses in this study.

Table 2 Proxy and model table for each hypothesis

	Explanatory - Theoretical concept	Proxy variable	Dependent	Impact prediction
Hypothesis 1a	Securing market expectation	ln Pledged	Time to Follow-up	Negative
Hypothesis 1b	Securing market expectation	ln Pledged	Amount	Positive
Hypothesis 2	Securing market satisfaction	Satisfaction	Amount	Positive
Hypothesis 3	Market dissatisfaction	Dissatisfaction	Time to Follow-up	Positive
Hypothesis 4	Prior partnership w. capital provider	Partnership	Amount	Positive

5.3.4 Control variables

Referring to the venture capital and crowdfunding research flow, we included control variables in the research model. We mainly controlled for the factors observed in the crowdfunding and venture literature to influence the successful fund attraction of projects and companies. We first controlled how much information about the founding team was disclosed, Team Information. We measured it through counting the number of words used to express project creators on a webpage. Next, we controlled human capital and social capital aspects of the entrepreneur, following prior venture investment research. Prior crowdfunding studies have often used the founders' experience level or education to proxy human capital level (Ahlers et al., 2015; Piva & Rossi-Lamastra, 2018). We followed the preceding method, counted the number of project creators' prior founding experiences as Human Capital. This represents individual capital factors such as the founder's prior experience or fame and is a variable that has often been addressed in crowdfunding studies. Researchers have uncovered the impact of social capital on crowdfunding using a proxy measure, like a Facebook friend count or backing experience count (Lukkarinen et al.,

2016; Colombo, Franzoni, & Rossi–Lamastra, 2015). In the same way, we regarded the creator's activity count in the platform as Social Capital.

Next, we controlled two factors that affect successful funding and that may affect further corporate value. Real-time information updates are posted when the project founder announces further progress and changes after the campaign launch. In terms of funding success strategy, this activity was found to have a significant impact (Kuppuswamy & Bayus, 2013; Block, Hornuf, & Moritz, 2018). However, Block, Hornuf, and Moritz (2018) pointed out that there could be six different types of updates, and they may differ from each other in terms of impact. Among them, we observed that Progress Update, which announces the progress of projects, and New Update, which announces changes in project content, might affect follow-up funding. These two types of updates were counted and controlled. Collective crowdfunding studies have also stressed the importance of detailed project descriptions and the use of audiovisual materials, such as images and videos (Greenberg et al., 2013; Mollick, 2013). Visual materials are meaningful as costly signals because they can be indicators of how prepared the founders are from the project preparation stage. We controlled the number of images and videos, Visual Description, as this effect may also affect future investment attraction. Finally, we included dummy variables of Project Year, Country, and Category.

5.3.5 Empirical model

We used two major dependent variables in this study. The first is Time to Follow-up.

To verify a suitable model with our proposed variables, a residual distribution test was conducted for OLS regression as a first step. From Cameron and Trivedi's decomposition of the IM-test, the null hypothesis for heteroscedasticity problem was rejected with a p value of 0.2443. Moreover, the IM-test rejected skewness (p = 0.2753) and kurtosis (p = 0.7556) at the 95% significance level. We also conducted the Breusch–Pagan test (Prob>chi2 = 0.1488) and Shapiro–Wilk W-test, and the results did not return critical elements that disturb satisfying best linear unbiased estimate conditions. In this environment, we considered an OLS model to be suitable. However, two models were additionally tested considering the robustness of the analysis. First, Tobit regression with 95% at both ends as a limit was conducted. Second, negative binomial regression was performed by taking the characteristics of the dependent variable into consideration and rounding it up on a daily basis. The model equation we used for Hypotheses 1a and 3 to test the impact on time to the follow-up financing attraction is

$$\boldsymbol{Followup\ period} = \beta_0 + \beta_1 * \boldsymbol{ln\ Pledged} + \beta_2 * \boldsymbol{Dissatisfaction}$$

Second, the amount of financial resource acquired in subsequent fundraising were collected from the investment announcement at the time of investment attraction. They were measured based on the US dollar value at the time of investment. We corrected the dependent variable to logarithm value, lnAmount, reflecting that the distribution of differences between companies was exponential. Again, we conducted Cameron and Trivedi's decomposition of the IM-test, and the heteroscedasticity problem was rejected with a p value of 0.4821. The potential skewness (p = 0.9612) and kurtosis problem (p = 0.2024) of the model was also rejected. The Breusch–Pagan test for heteroscedasticity

showed a chi-squared probability of 0.4094 to reject biases at the 95% significance level. In conclusion, we determined that it is appropriate to use OLS, following previous studies. In exploring the effect on follow-up resource amount, we used the stepwise regression method. This examines whether prior events that occurred in chronological order are significant in the process of determining the investment decision. The model was constructed by adding variables for the partnerships in preparation for crowdfunding (Hypothesis 3) first. Then, the fundraising results of crowdfunding (Hypothesis 1b) and the satisfaction of the reward product (Hypothesis 2) were added to subsequent regressions. Through this, we aimed to examine the effect of adding variables of each crowdfunded business stage on the model explanatory power. However, we additionally tested with Tobit regression (95% at both ends as a limit) considering the robustness of the analysis. The model equation used to examine the effect of explanatory variables from Hypotheses 1b, 2, and 4 is

$$\ln \boldsymbol{Amount} = \beta_0 + \beta_1 * \boldsymbol{Partnership} + \beta_2 * \ln \boldsymbol{Pledged} + \beta_3 * \boldsymbol{Satisfaction}$$

5.4 Results

Table 3 shows the regression results of our first model, describing the impact of crowdfunding success and dissatisfaction comments on period of startup in follow-up venture financing market. The dependent variable is Time to Follow-up in number of days, indirectly measured by counting days from latest reported investment attraction after crowdfunding for the focal startup. A positive impact indicates that it made longer subsequent investment case observation. The first column Baseline shows the baseline

regression result with only control variables included in the regression.

Table 3 Results for regression (with dependent variable, *Time to Followup*)

Time (period in days)	Baseline	OLS	Tobit	NegativeBinomial
Explanatory Variables				
lnPledged		138.1***	138.1***	0.162***
		(47.37)	(47.82)	(0.0598)
Dissatisfaction		-172.3***	-187.6***	-0.208***
		(60.97)	(61.84)	(0.0754)
Controls				
Team Information	1.673	1.949	2.165	0.00372*
	(1.602)	(1.544)	(1.552)	(0.00208)
Human Capital	-21.16	-35.22	-44.81	-0.0346
	(50.97)	(49.25)	(49.61)	(0.0668)
Social Capital	5.755*	7.474**	7.778**	0.00844**
	(3.119)	(3.058)	(3.067)	(0.00406)
Progress Updates	-19.88	-22.39	-25.26	-0.0221
	(22.17)	(21.40)	(21.46)	(0.0287)
New Updates	161.7***	127.0**	136.4**	0.136*
	(57.14)	(56.15)	(56.17)	(0.0766)
Visual Description	63.05	41.98	46.93	0.0246
	(39.38)	(38.55)	(38.93)	(0.0499)
Observations	110	110	110	110
Model	F statistics	F statistics	LR chi2	LR chi2
	2.51	3.31	26.06	20.04
	Prob > F	Prob > F	Prob > chi2	Prob > chi2
	0.0263	0.0021	0.0010	0.0102
	R-squared	R-squared	Pseudo R2	Pseudo R2
	0.1275	0.2079	0.0168	0.0120
	Adj R-squared	Adj R-squared	sigma	lnalpha
	0.0767	0.1452	493.9***	-0.830***
			(36.27)	(0.127)

*** p<0.01, ** p<0.05, * p<0.1

The second column shows the quantitative result for the proposed model using OLS. The reported result supports Hypothesis 1a, that the higher the expectations of the initial market shown by crowdfunding with the pledged amount, the longer it passed for the follow-up financing progress (β_1=138.1, p<0.01). Our proposed model showed a significantly higher adjusted R-squared value than the baseline, with better model

significance in F statistics. The result supported the reliability of the tested hypothesis results. The result of the Tobit regression (Column 3) came to a similar conclusion. With the appropriate model reliability, the coefficients of explanatory variables differed within 10% when compared to OLS. The negative binomial model (Column 4), substituting dependent for an integer date, also showed results that supported our hypotheses with significance.

Table 4 shows the regression results for our second model, describing the impact of crowdfunding-related characteristics on investment attraction amount for follow-up venture financing. A positive coefficient indicates that the focal firm received better value of investments at the subsequent fundraising. The first column, Baseline, shows the baseline regression result with only control variables included in the regression.

Table 4. Results for stepwise regression (with dependent variable, *ln Amount* **)**

lnAmount	**Baseline**	**Stepwise 1**	**Stepwise 2**	**Stepwise 3**	**Tobit**
	Amount of fund raised on Follow-up Financing				
Explanatory Variables					
Partnership		0.597***	0.346**	0.330**	0.341**
		(0.193)	(0.166)	(0.155)	(0.140)
lnPledged			0.878***	0.854***	0.876***
			(0.137)	(0.128)	(0.116)
Satisfaction				0.548***	0.570***
				(0.142)	(0.128)
Controls					
Team Information	0.00837	0.0109*	0.0146***	0.0144***	0.0147***
	(0.00639)	(0.00617)	(0.00518)	(0.00483)	(0.00434)
Human Capital	0.0234	-0.0133	-0.0956	-0.104	-0.0876
	(0.197)	(0.189)	(0.158)	(0.148)	(0.133)
Social Capital	-0.00965	-0.00735	-0.00834	-0.00984	-0.00918
	(0.0129)	(0.0124)	(0.0104)	(0.00966)	(0.00866)
Progress Updates	-0.169*	-0.148*	-0.171**	-0.153**	-0.152**
	(0.0897)	(0.0861)	(0.0720)	(0.0672)	(0.0603)

New Updates	0.237	0.212	0.0634	0.000286	0.00837
	(0.224)	(0.214)	(0.181)	(0.169)	(0.151)
Visual Description	0.0805	0.105	0.00160	-0.0264	-0.0353
	(0.209)	(0.201)	(0.168)	(0.157)	(0.141)
Observations	110	110	110	110	110
F statistics	1.57	2.18	5.22	6.48	Prob > chi2
Prob > F	0.0915	0.0096	0.0000	0.0000	0.0000
R-squared	0.2131	0.2870	0.5079	0.5778	Sigma
Adj R-squared	0.0778	0.1553	0.4105	0.4887	1.279***
					(0.0885)
					Pseudo R2
					0.2136

*** p<0.01, ** p<0.05, * p<0.1. Dummies include Project year and Country

The next three columns (Stepwise 1, 2, and 3) of Table 4 report the stepwise regression results obtained by adding explanatory variables chronologically. Stepwise 1 reflects the situation before crowdfunding, which includes only the explanatory variable of the project founder's prior partnership with professional investors, Partnership. Coefficient β_1 showed a positive value at the 99% significance level and the model's F statistics improved from the baseline significantly (Prob>F at 99% significance). Stepwise 2 reflects the situation in which fundraising through crowdfunding was completed. The explanatory variable, lnPledged, which represents the funding performance of the project, was added to Stepwise 1. The regression results showed that both β_1 and β_2 had positive values with a high level of significance. The model significance rose strongly. The rise in explanatory power (adjusted R-squared value from 0.1533 to 0.4105) also showed that the success of crowdfunding significantly influenced the entrepreneurial process. Stepwise 3 reflects the situation after reward delivery. The explanatory variable, Satisfaction, was added to the previous column. Stepwise 3's explanatory power rose (adjusted R-squared value from

0.4105 to 0.4887), showing a significant increase with the additional explanatory variable. Our full model showed positive coefficients for all three determinants: β_1 (0.330, $p<0.01$), β_2 (0.854, $p<0.01$), and β_3 (0.548, $p<0.01$). The full model supported all related hypotheses (1b, 2, and 3) and showed stepwise increasing explanatory power with model reliability. The result of Tobit regression (Column 5) came to a similar conclusion. When the model reliability was appropriate, the coefficients of explanatory variables differed within 5% when compared to the full OLS model.

Figure 2 shows the plotted result of Hypotheses 1a and 1b. The straight bold line represents the linear relationship between the pledged amount and follow-up fundraising results tested in this study. The dotted line is the result of plotting quadratic regression results while considering the possibility of a non-linear relationship (shaded area represents 95% CI).

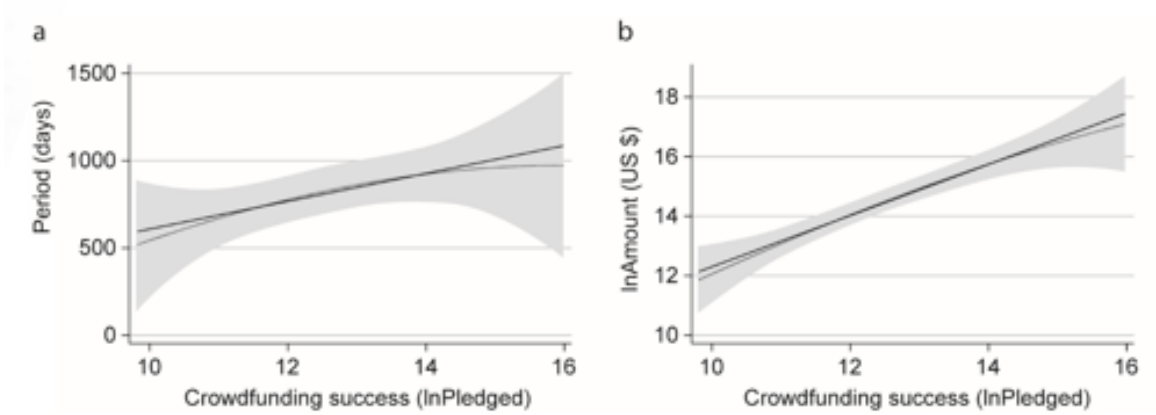


Figure 2 *Effect of crowdfunding success on follow-up amount and period (Hypotheses 1a and 1b)*

Figure 3 shows the plotted result of Hypotheses 2 and 4, the effect of funder satisfaction and prior partnership on follow-up period, respectively.

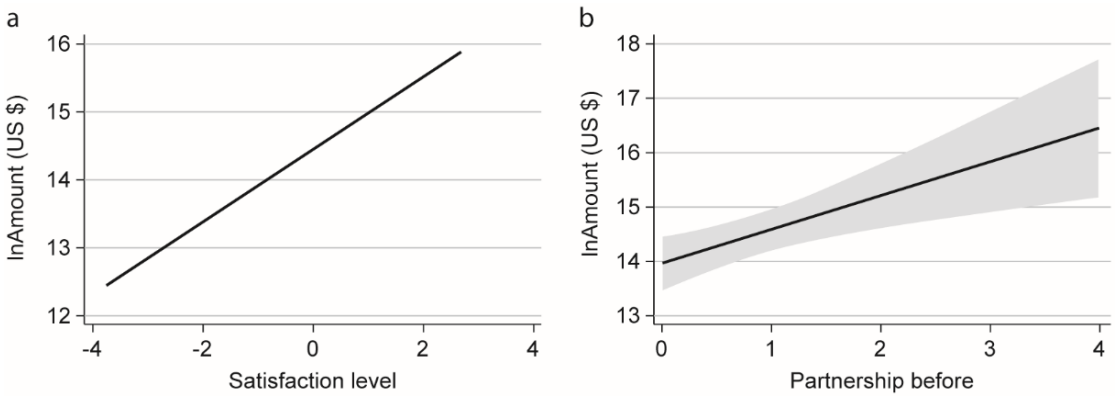


Figure 3 *Effect of satisfaction and partnership on follow-up funding amount (Hypotheses 2 and 3)*

5.5 Discussion with case studies

Attracting the proper funds needed for business growth is essential for driving innovativeness in venture ecosystems. As a result, theoretical interest in venture capital and funding strategies have increased. Crowdfunding as an emerging form of early startup funding has recently attracted attention from researchers (Belleflamme, Lambert, & Schwienbacher, 2010). Here, we expanded the context of prior crowdfunding studies to explore whether the results of the crowd fundraising affect future follow-up venture financing and business development.

In the context of successive financial resource acquisition, previous research stream was focused on success factor of subsequent investment attraction. However, as important as whether or not an investment deal was made, long-term persistence and the amount of

financial resources attracted, are crucial factor for successful entrepreneurial process.

The first focus of this study was period until follow-on fundraising of startup in venture finance market after crowdfunding. Column 2 of Table 3 indicates that the effects of crowdfunding success on further financing period we hypothesized were significant. The success of a reward-based crowdfunding campaign represents more than just recognition in the market; it also shows how appealing the product idea is to early-stage consumers. Although this does not guarantee the quality of the project, funders are able to secure funds for first-level production and idea implementation after fundraising to proceed the business for a while. However, our empirical results support Hypotheses 1a. Baseline model had relatively low explanatory power, however, our proposed model showed relatively advanced explanation of period (Adj R-squared value of 0.1452) with reliability (F value at 99% significance).

Meanwhile, it was inferred that securing enough pre-purchase funds delays urgent need of funds by reducing the need for urgent bridge financing. Entrepreneurs were able to pursue the next stage of venture funding in a more stable state, which increased the chances of longer follow-on period. Moreover, crowdfunding success confirms business items to meet market needs. The results of this linear modeling are visualized on the left of Figure 1. We also hypothesized and tested non-linear quadratic relationships for model robustness, the results expressed by the dotted lines show a convergence of linearity and support the original model.

The second focus of this study was on the amount startup acquired on follow-up

funding of crowdfunded projects. Column 4 of Table 4 (full model) indicates that the effects of all three determinants we hypothesized are significant. Crowdfunding success with sufficient funds raised proves that the market is interested in the product concept. We regard this context as the expectation of the early market. Our empirical result shows that the crowdfunding results directly affect subsequent funding performance positively (Hypothesis 1b). This also indicates that market expectation allows founders to go beyond securing funds, but to also gain confidence and high self-esteem from the initial market response. As the realization fund is satisfied, the subsequent funding purpose advances a step further, and venture capitalists appraise the startup with better firm valuation. This proves that crowdfunding plays a role in advancing the early stage of the entrepreneurial process. The results of the linear modeling of Hypothesis 1b are visualized on the right of Figure 1.

OUYA is a company that makes open video game consoles for televisions. In 2012, through kickstarter.com, OUYA carried out a crowdfunding project for the first product. They prepared for the development of crowdfunding products by attracting initial funding from a single seed investor, and as a result of successful funding, they succeeded in raising $8.4M, far exceeding the $0.95M target by more than 900%. They succeeded in attracting a 15M Series A investment with Kleiner as the lead investor 9 months after completing crowdfunding. Also, based on this public interest, it was able to attract follow-up investments from Alibaba, a strategic capital, in less than a year.

In the linear model, the amount of follow-up investments was found to differ from the

amount raised from crowdfunding in a logarithm gap of about 1.8 (a multiple of approximately 65 times). We also hypothesized that this multiple could have different aspects for extreme pledged cases. Therefore, we tested the non-linear quadratic relationship. The results supported our original findings, showing converging linear appearance excluding both extreme ends.

The empirical result of Hypothesis 2 shows that the satisfaction of funders serves as a positive determinant of subsequent corporate valuation. Funders' satisfaction attests to the project's quality and in turn, positively affects later investor's decision-making. Satisfaction after product delivery enables more significant positive market signals. This means that, during the VC investment negotiation, the investor's uncertainty concerning implementation risk will be lessened. It represents a further step in the stages of business development, which leads to the need for larger funding for the company. At this point, entrepreneurs need marketing funds to widen their reach. Therefore, early market product satisfaction from the post-crowdfunding delivery phase has a strong impact on investors' valuation.

BLOCKS provides a sensor platform for industrial data collection and produces a modular smartwatch product which was crowdfunded through Kickstarter in 2015. The fundraising result was excellent with 1.6M fundraising, and they actively engaged in community activities and attracted social attention from crowds. However, they failed to induce customer satisfaction through successful implementation of the proposed idea. They failed to complete mass production and deliver the product, and many funders

defined it as a scam project and requested a refund. The company needed urgent fund in this process, tried to solve this problem by attracting relatively very low amounts of $50K and $250K of follow-up seed funding in hurry, but in the end, it did not reach a good end.

Both market signal from securing expectations and consumer satisfaction are essential factors that entrepreneurs should pursue to have attain positive financing performance. To make further progress of startup through crowdfunding, it is necessary to pay more attention to securing the funders' satisfaction as well as the fundraising itself. Identifying the distinction and role differences between two procedures adds practical implication to existing intuition. The results of this linear modeling are visualized on the left of Figure 4.

For Hypothesis 3, we considered the impact of building relationships with formal investors on follow-up financial resource acquirement after crowdfunding. The empirical results support the positive effects of partnership with capital providers on subsequent funding amount. The results of this linear modeling are visualized on the right of Figure 4. Investors at the very early stage of funding, such as accelerators and company builders, were experts whose support went beyond that of a capital provider. In addition, they contributed network and firm structures to create substantial growth for startups, playing a positive role in post-crowdfunding valuation. Their presence reduces the investment risk perceived by later investors and enhances the founders' position in investment negotiations.

LIFX is a startup company manufactures smartphone controllable wifi-LED lights. In 2013, they received seed funding from Angelcube in a startup accelerator program, and prepared crowdfunding for mass production of their first LED product. At Kickstarter, they

attracted a 1.31M USD pledge, more than 10 times the initial set target. After confirming these achievements, Angelcube actively cooperated to attract follow-up investment after seed funding, for further product development and business extension. This led to the result of receiving a series A investment equivalent to a high amount of 15M USD with a lead investor of Sequoia Capital, a famous venture capital company, in a relatively early period in June 2014.

Form Labs is a low-cost 3D printer manufacturer, who attracted 1.8M USD seed investment in November 2011, which is relatively high amount for extremely early firm by SOSV, a multi-stage venture capital. This was possible due to two founders who made MIT Media Lab based laboratory-related technology startup and have attracted active investment from MIT Media Lab Director Joi Ito. The company attracted attention from public even before launching crowdfunding campaign for this successful early financing. At the time when 3D printers are starting to attract social interests, many crowds participated in Kickstarter funding, and raised 2.9M USD pledge amount from crowdfunding. Based on the confirmation of such market interest and the success of the followed product implementation, they succeeded in attracting 19M series A financing 12 months after crowdfunding ends, and SOSV participated in the round as moderator who affected the amicable valuation.

In terms of strategies for obtaining financial resource at the early startup period, crowdfunding is a useful tool for examining early market reactions for business plans. The conclusions of this study suggest that two different market reactions that can be realized

during and post-crowdfunding, and each has meaning and effect on further venture development performance. The effects of strategic choices by founders of properly leveraging relationships with investors in the process of crowdfunding can affect further growth of startups. Entrepreneurs are encouraged to establish good formal investor partnerships from the outset, which is advantageous for value assessment in subsequent financing market.

The entrepreneurial significance of crowdfunding was identified by testing further development pathways after fundraising on online platforms. Moreover, in an effort to analyze this process empirically and with business cases, we linked data of crowdfunding projects that led to venture-backed startups, and thereby made a methodological contribution to expand the scope of the related research stream. We also present the effect of obtaining initial market feedback in two stages and explored the difference. To this end, we not only analyzed fundraising performance on the platform but also applied a method to proxy product satisfaction through a sentiment analysis of funder comments. The results have implications for crowdfunded startup research flow by empirically identifying the non-financial crowdfunding role in the growth process. Furthermore, the results have implications for entrepreneurs who want to introduce crowdfunding in their strategic growth process.

5.6. Limitations and further research

The study has the following limitations, which create possibilities for further

research. First, we analyzed financing cases for crowdfunding projects that successfully attracted subsequent rounds of funding. However, most crowdfunding projects fail to attract the next stage of entrepreneurial finance after product delivery. In addition, the data are biased to value-known information for projects that have successfully attracted investment. Therefore, future work should further develop the sharpness of the arguments. Sample data could be constructed by including crowdfunded projects that have failed but have been further developed to reveal additional determinants of follow-up investment attraction. Such an approach would help to drive the success of future venture investments and increase startups' chances of survival in the next stage of startup growth.

Second, there are limitations in terms of proxy methodology. The sentiment analysis we adopted could not proxy the exact satisfaction of customers from sentences left on the platform. Nevertheless, this model's reliability has been verified in many existing studies and is a good starting point to address the problems of satisfaction with crowdfunding that were difficult to catch. The model could serve as a good initial attempt in entrepreneurial research to more actively adopt computational skills to proxy new measures. Future work could extend this by leveraging computational methodology to develop better-performing proxies.

A promising future research direction would be to consider additional factors according to different funding stages and entities of follow-up funding. This could provide more in-depth analysis of startup growth patterns. In addition, this study presented an investor relationship strategy that can be adopted by founders based on the purpose of

subsequent investment. Segmenting specific implementation behaviors for this would be of practical help for founders who choose crowdfunding as their early entrepreneurial capital source.

Chapter 6. Conclusion

6.1 Overall Summary

This thesis explores the values and characteristics of crowdfunding in the entrepreneurial process through the multidisciplinary theoretical development and introduction of multiple computational methodologies. In the process, this thesis presents an action-strategic proposal to entrepreneurs who are concerned about capital through crowdfunding.

Crowdfunding through the Internet is a relatively new form of venture financing, attracting researchers' and practitioners' attention. In particular, reward-based crowdfunding participants showed two-sided characteristics as investor and customer; thus, a complex study was conducted with this understanding in the entrepreneurial financing field. By focusing on the innovation value in the early stages of attracting startup funds, the thesis tried to clarify the value in the entrepreneurial financing research flow. Accordingly, Chapter 2 covers the flow of research related to entrepreneurial financing, from venture capital, business angel, crowdfunding, and other new methods. In this process, missing links to understanding crowdfunding as an innovation tool were embodied, and three studies were organized to understand the subsequent development process of the crowdfunded project.

The first study in Chapter 3 draws attention to entrepreneurs' action strategies for successful fundraising attraction that can be implemented after the launch of the campaign.

In particular, the long-discussed factor of the novelty of ideas is introduced and empirically tested as a key moderator of strategic decisions. From the entrepreneur's perspective, there are three categories of actions that can be strategically taken during the campaign period; diversification of business, information updates, and two-sided communication. The diversification of business has been shown to be positive for project success in general, but for projects with a high novelty level, the effect could have been more minimal or rather reversed. The impact of information updates was positive in the early stages but showed a non-linear quadratic relationship with performance that had a rather adverse effect when excessive. Finally, communication with the funder through comments was shown to be a strategy that favored the success of the project.

A challenging methodological approach to natural language processing using deep learning was proposed in this study. The ex-ante novelty at the moment of investment decision, without accompanying usefulness, is a difficult concept to quantify. By measuring this through the relative distances between the business idea texts, the study demonstrated the strategic effect difference between novel and redundant groups. This implied that in order for novelty business ideas to be attractive, it had been shown that sharpening without losing business focus must be held by the founder. It also suggested that the proper use of other strategic activities is as important as the driving force behind project success, as well as making the initial business plan attractive.

The second study in Chapter 4 proposes a framework for participants' satisfactory process of reward-based crowdfunding. Considering the characteristics of reward-based

crowdfunding participants through the synthesis of innovation participants and pre-purchasers, delivery of values satisfying both aspects was considered as the key to ensuring overall satisfaction. The utilitarian value, similar to the frame of consumer research, comes from delivering practical functional satisfaction, which is secured through the successful implementation of the proposed idea. To this end, it was shown that sufficient fund security in project fundraising and the human capital capability of the founder were positive. Hedonic value is sensory satisfaction, which comes from the emotional feelings of the participants. Mainly, crowdfunding participants who put importance on participation in the innovation process express satisfaction with the perceived partnership involved in the implementation process. To this end, it was shown that providing sufficient communication and transparent delivery of information through visual supports helped improve the perceived hedonic value.

The study identifies four significant factors delivering value to crowdfunding participants. As the dependent, this study measured and used the satisfaction of receiving and feeling the project product after participating in crowdfunding. In this process, a computational method for analyzing social media sentiment through Python NLTK was introduced. The study's conclusions offer implications for entrepreneurs who aim to develop their business and secure markets expectation through crowdfunding, not just aimed at raising funds. Satisfying funders is the basis for positive signaling to subsequent markets. The mechanism that secures this satisfaction is systematized, and crowdfunding determinants that influence the process were examined.

Finally, Chapter 5 discovers subsequent development after the implementation of a crowdfunded startup, focusing on follow-up venture funding attraction. This study specifically focused on two outcomes: the timing of subsequent fundraising and the corporate valuation at subsequent fundraising. In the subsequent funding of startups after crowdfunding, the study explored determinants that could affect these two factors. In the framework of this study, market feedback obtained through crowdfunding was divided into two parts; market expectation obtained through fundraising success and market satisfaction obtained through product delivery and response. Secure market expectation is coincident with the inflow of funds, and it has been found that the venture stage of subsequent funding is advanced to slow the investment attraction time but contribute to high valuation. It was revealed that securing market satisfaction did not directly affect follow-up funding timing, but it contributed to receiving a high value by giving a positive signal to the market. The study also saw two relational aspects of crowdfunding practice; communication that affects the relationship with the funder and proactive institutional partnership before crowdfunding. As a result of empirical analysis, the improvement of the funder relationship through communication and information leakage accelerated the speed of subsequent investment inflow, and the network effect of the prior relationship contributed favorably to the value of a subsequent investment.

Through keyword matching and web data mining, sample data that succeeded in subsequent venture capital fundraising was constructed using the same items after participating in crowdfunding. This enabled a quantitative study of the development path

of the crowdfunded project, which was difficult to test directly. The empirical results showed that market relationships, funder relationships, and institutional relationships in the crowdfunding process could all have a direct impact on subsequent investments.

6.2 Implications and Contributions

Overall, this thesis examined the entrepreneur's action strategies to make startup founding through crowdfunding by dividing the process into three: fundraising, implementing ideas, and attracting follow-up investment stages. This is to focus on crowdfunding as the first step in entrepreneurship, away from the flow of existing literacy research that has focused mainly only on the fundraising stage of crowdfunding. Through this, it provides a clue to view crowdfunding, a niche emerging financing method, as a new pipeline of innovation rather than a simple one-time financing method. By presenting strategic guidelines for founders to utilize it appropriately, it can be of practical help in understanding the entire process of crowdfunding and the suitable startup process.

Seoul entered the top 10 global startup ecosystems in 2022 for the first time in history (GSER,2022). After COVID-19, the importance of economic growth by innovative entrepreneurs is being emphasized. This was confirmed in 2021, which showed explosive growth, and even if we look back at 2022, which is facing a downturn, we need to think about the next growth traction. The emergence of various alternative finances, such as crowdfunding, DAO, and ICO is basically a shift in governance. This change started about ten years ago, and although various forms have appeared and gone through trial and error,

the trend of the times is becoming clearer. Therefore, it is meaningful from the policy point of view to examine how governance from the majority affects each process, from the adoption of ideas to successful innovation, and to solidify an important axis of the innovation pipeline through this. In particular, South Korea has a strong interest and passion for governance change and is excellent at responding to the new form of digitalized platforms. The consideration of this thesis contributes to a theoretical and practical understanding of the process so that entrepreneurs can effectively utilize the pipeline of successful startups by maximizing this advantage.

Policymakers and platform businesses must remember that participants in crowd governance find satisfaction in the experience themselves. It may be a mistake to introduce regulations like traditional finance fields by providing restricted functions to funders in the name of protecting them. Providing an appropriate level of participation based on an understanding of crowd governance and freeing the playground will maximize the new era's startup pipeline. This is the way to get ahead of the startup environment tailored to the needs of the times in a rapidly changing technological society.

Founders also need to understand this characteristic of crowd funders well and should make good use of the fact to utilize this alternative finance better when they want to realize an idea with a high novelty level. As crowd-based fundraising reflects new cultural demands, it should not be approached with the same rules as traditional finance. This thesis examines the complementary and serial relationship between niche and traditional fundraising to lead to a sustainable growing startup. This process was clearly defined in

three steps throughout the thesis, and three different studies were organized to look at each step to explore the serial relationship.

Chapter 3 focuses on the birth of novel ideas and the idea selection stage. The valuation of ideas is subjective and trailing, but practitioners can grasp the radicality of their ideas. Accordingly, by suggesting a strategic difference that can appeal to the early public, implications were suggested for practitioners to consider the idea's novelty level when trying to obtain early-stage funding through crowdfunding. In addition, we went a step further in exploring the possibility of success according to the characteristics of the project and conducted a practical strategic action that could be conducted during the fundraising period. This suggests what action can be taken to capture as much public as possible in a given business proposal. This also gives implications to crowdfunding platforms that want to contribute as early contributors to the entrepreneurial process. By providing more active communicative functions and opening up a place for entrepreneurs to promote their ideas is to increase crowd participation and further contributes to the development of the platform. In addition, measuring the heterogeneity of business ideas using deep learning opens up many possibilities for future creativity and venture research. Although it is an incomplete initial attempt, the active incorporation of computer science techniques will greatly expand the scope of entrepreneurial finance research.

Chapter 4 specifically explores the mechanisms that create post-crowdfunding funder satisfaction after fundraising. Crowdfunding platforms are causing a lot of disappointment as well as high interest. Entrepreneurs can have more interest in strategies that focus on

attracting the fund, but to consider crowdfunding as an early contributor to the entrepreneurial process, it is imperative that explore subsequent satisfaction at the post-fundraising stage. The conclusion of the study first suggests to participants of crowdfunding that the idea implementation capacity of entrepreneurs must be an important investment determinant. Unlike formal professional investors who make relatively rational investment decisions, crowdfunding participants make more emotional decisions. The result suggests that in order to obtain higher satisfaction in one's decision-making, capacity evaluation of the founder based on resources should be the main factor. It also suggests practical application to founders that hedonic value delivery should be taken in the post-fundraising process in order to secure consumer satisfaction. This is a characteristic of crowdfunding participants, which is prone to overlook in product development and business development by founders. Founders who chose crowdfunding as an initial fund should pay more attention to the next step of securing communication and information balance even after funding is decided.

Chapter 5 highlights the importance of the post-crowdfunding process after fundraising. The rapid growth of innovative companies through crowdfunding has been theoretically addressed in many previous studies and is what business founders expect in practice. However, it took a lot of work to deal with an empirical study of a case that went through reward-based crowdfunding and progressed to the next venture growth stage. This study suggests that the characteristics of subsequent investments can be secured through a crowdfunding process by using a unique dataset. It also emphasizes the importance of the

role of the post-fundraising process as well as fundraising for high-speed growth in subsequent venture capital attraction. Practitioners should be aware that not only the process of attracting funds but also paying attention to securing the satisfaction of the funder through product implementation will speed up future business growth. Also, in this process, forming a relationship between crowdfunding participants and other formal investors can be strategically utilized as an essential follow-up investment characteristic decision variable.

The consideration of each step constituting this thesis has methodological and theoretical limitations. This was inevitably caused by limitations of the new methodological application, data limitations, or limitations for the focus and purpose of the study. In further development work, a more segmented structure of modeling that describes intermediate mechanisms should be addressed. In particular, in study 2, it would be a good extension to demonstrate the intermediate variables for how each value is transmitted and to explore the explanatory power of each parameter that leads to the final satisfaction. In addition, the remaining task is that this thesis has yet to be able to explore complementary proxies further to verify the machine learning methodology for measuring novelty. It would be possible to additionally verify the model through investor questionnaires/topic-modeling/others in further studies. Also, in this process, the effect of the difference from the novelty of the idea on the follow-up process should have been examined in detail. By further exploring this part, the crowdfunded startup strategy according to the novelty can be presented more clearly.

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Abstract (국문 초록)

본 연구는 크라우드펀딩을 통해 참신한 아이디어로부터 지속 가능한 기업으로 발전해 가는스타트업의 펀드레이징 및 발전 전략을 탐구한다. 참신한 아이디어를 제시하여 설득하는 단계부터, 후속 발전에 이르기까지 크라우드펀딩을 통해 스타트업이 성공적으로 성장해 나가는 요인을 분석하고, 그에 따라 창업가의 관점에서 유효한 행동전략이 무엇인지 밝힌다. 창업가가 크라우드펀딩을 펀드레이징 도구로 활용하면서 자신의 비즈니스를 전개하기 위한 전략적 초점으로 캠페인, 가치 전달, 후속 발전의 사이클을 이해한다.

첫 번째로 크라우드펀딩 스타트업의 시작인 캠페인 펀드레이징 지점에서, 참신함을 측정할 수 있는 지표에 초점을 맞추어 참신함 정도에 따라 크라우드펀딩 캠페인 동안 창업자의 행동전략에 대해 탐구한다. 본 연구는 사전적 참신함을 이해하기 위한 머신러닝 기반 방법론적 측정방식을 제안하고 이를 활용한 행동전략을 제시한다. 아이디어의 참신함이 보상형 크라우드펀딩의 성공적인 모금을 위해 프로젝트 설립자가 행동해야 할 방향을 바꾸는 핵심 요소임을 실증한다. 두 번째로, 보상형 크라우드펀딩 참여자의 만족스러운 크라우드펀딩 경험을 위한 프레임워크를 제안한다. 소비자 연구에서 차용한 실용-감정 가치 전달의 프레임을 통해 창업자가 크라우드펀딩 참여자에게 가치를 전달하는 결정 요인을 찾습니다. 이 연구는 캠페인 후 아이디어 구현 및 만족 전달 과정을 탐구하여, 이어지는 후속 비즈니스 프로세스를 광범위하게 이해하기 위한 사전 단계를 다룬다. 세 번째로, 후속 벤처 자금을 유치한 크라우드펀딩 스타트업의 특성차이를 살펴본다. 특히, 후속 벤처 자금 조달의 시기와 가치 평가가 크라우드펀딩 캠페인 프로세스의 특성에 어떻게 영향을 받는지 분석한다. 본 연구는 크라우드펀딩의 과정과 장기적으로 지속가능한 스타트업 사이의 연관성을 심층적으로 연구하였다.

주요어: 기업가정신, 크라우드펀딩, 스타트업, 참신함, 자금조달
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