Center for
Economic Theories and Policies
Sofia University St. Kliment Ohridski
Faculty of Economics and Business Administration

ISSN: 2367-7082

Bulgarian Economic Papers

Virtual Community Characteristics as Success Factors for Crowdfunding Projects

Teodora Marinova

BEP 05-2019
Publication: May 2019

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Abstract: *In this paper I investigate the factors influencing the likelihood of crowdfunding projects' success by analyzing data from the crowdfunding platform Kickstarter. The research focus is on the influence of virtual community characteristics. The results show that the probability of project success is positively influenced by a higher number of project supporters but a larger amount of comments on the project, controlled for project definition factors, is found to decrease the likelihood of project success. This is in line with previous findings of a double-edged impact of the size of the virtual innovation community and the amount of peer-to-peer interaction on the likelihood of successful innovation input by the participants.*

Keywords: User innovation, Crowdfunding, Virtual communities, Innovation communities
JEL: O31, O32, O33

1. Introduction and Research problem

In the age of digitization, virtual social communities become increasingly integrated in previously industry-driven processes such as innovation. Virtual communities provide input to the innovation process by generating ideas for new products, testing prototypes or even accumulating funds for the realization of new projects. The potential of community-based innovation for companies lies in the dispersion of innovation-related knowledge among many actors. When user problem solvers are concentrated in a community around a certain interest, the collective intelligence coming from their diverse backgrounds could be leveraged for innovative efforts (Terwiesch and Xu, 2008). Moreover, communities comprise large numbers of individuals who can identify flaws and drive new product quality through constructive criticism and error correction, rarely exercised in firms with hierarchical structures (Lee and Cole, 2003). Companies actively leverage these benefits of user networks by making an "open call" to user communities for participation in innovation, labeled also as an act of "crowdsourcing" for innovation – the act of outsourcing a task once performed by an employee to a large, undefined group of people external to the company (Bayus, 2013; Howe, 2008).

Another user community concept that was derived from the broader concept of crowdsourcing is "crowdfunding" - defined as an open call, essentially over the Internet, for financial resources in the form of a donation or often in exchange for a future released tangible product, service or reward (Belleflamme, Lambert and Schwienbacher, 2010; Kleemann, Gunter and Rieder, 2008; Schwienbacher and Larralde, 2010). The difference between crowdsourcing and crowdfunding is that instead of pooling labor resources, crowdfunding pools another factor of new product production: capital. While user innovation communities focus on the generation of new ideas and solutions, crowdfunding communities play a role as enablers for assessing, funding, scaling and commercializing user solutions (Brem, Bilgram and Marchuk, 2017). The open call takes place via online crowdfunding platforms such as Kickstarter, RocketHubm and IndieGoGo, which provide a platform for product creators and funders to exchange resources in order to realize innovation projects without any financial intermediaries (Cordova, Dolci and Gianfrate, 2015). According to Statista, the number of crowdfunding platforms worldwide is on the increase, the largest markets being North America and Asia (Statista, 2016a). There are more than 450 crowdfunding platforms in the world and the accumulated funding is going at a rapid pace (Cordova, Dolci and Gianfrate, 2015). In 2016,

the top 3 platforms worldwide by the value of funds raised are Kickstarter, IndieGoGo, and Crowdfunder.co (Statista, 2016b).

A differentiating characteristic of crowdfunding platforms compared to standard financing is that they require the participation of a large social community, information is directly exchanged and visible, and therefore social information is expected to have a role on influencing the crowdfunding project success (Kuppuswamy and Bayus, 2013). This raises the question of the social community characteristics which influence successful crowdfunding projects. While there is an extensive body of empirical research on virtual user innovation communities for idea generation, the crowdfunding communities remain up to date rather unexplored (Brem, Bilgram and Marchuk, 2017).

In the following paper, I aim to investigate the factors influencing the likelihood of crowdfunding project success and particularly – to examine if and in which way virtual community-related factors influence project success. I formulate research hypotheses based on extant research on success factors of crowdfunding projects and I empirically test the hypotheses by analyzing quantitative data from the globally largest crowdfunding platform Kickstarter.

2. Literature Review and Formulation of Research Hypotheses

There are several empirical studies investigating success factors of crowdfunding projects with various focuses. Extant empirical research is based mainly on data from reward-based crowdfunding platforms, where "creators" own the intellectual property and the funders from the community, also named "backers", receive a "reward" in exchange for their donation, which can be a tangible product or an experience. The reward scheme can contain different levels and rewards, whereby backers choose a reward item to support the project according to their preferences. Levels vary in number and in contribution amount. The rewards can be as simple as a thank you or affirmation or bigger and more tangible rewards, such as first released products and special editions. Innovation ideas span across various fields and vary in scope. Creators explain on the project page their project funding goal, planned use of the funds, and timeline for reaching their goals - project duration, and the proposed reward scheme.

Investigated success factors in extant crowdfunding research can be divided conceptually into project-related and community-related factors. Project-related variables can include *project*

category, *project duration*, *project's funding goal*, *reward scheme characteristics*, and *number of project updates*. Community-related variables include *the number of backers* (how many people pledged money for a project) and *the number of comments on the project*.

With regards to the project definition, several studies found a negative relationship between the project's funding goal and project success (Frydrych et al., 2014; Mollick, 2014; Kuppuswamy and Bayus, 2013; Xiao et al., 2014). Cordova, Dolci and Gianfrate (2015) studied 1,127 technology projects posted on four distinct crowdfunding platforms (Kickstarter, Ulele, Eppela and IndieGoGo) and confirmed previous findings that an increase in the project funding goal is related to a lower probability and extent of success. Another project characteristic - project duration, is found by Cordova, Dolci and Gianfrate (2015) to increase the chances of success, whereas Mollick (2014) and Kuppuswamy and Bayus (2013) found project duration to negatively influence the chances of project success. Since the latter studies tested the relationship on a larger dataset, containing 45,000 projects from various project categories, I assume the proposed relationship to be more generalizable and therefore I hypothesize a negative relationship between project duration and project success.

Hypothesis 1 (H1): *The size of the project funding goal is negatively related to the probability of project success.*

Hypothesis 2 (H2): *The project duration is negatively related to the probability of project success*.

Several researchers built their hypotheses based on the signaling theory, assuming that signals for high underlying innovation project quality will attract more backers and therefore projects will be more successful. Signals for project quality may include a well-designed project homepage with a high-quality content, the project being featured by the crowdfunding platform, high value of the top tier reward item or a high amount of already contributed funds. In a research of over 48,500 reward-based projects on Kickstarter, Mollick (2014) investigated the effect of several measures of project quality signals on the probability of project success. He found that the inclusion of a video and the lower number of spelling errors on the project page as well as being featured by Kickstarter on their homepage leads to an increased probability of project success (Mollick, 2014). Kuppuswamy and Bayus (2013) examined the same dataset restricting themselves to a period of two full years, 2010 and 2011, and they found a higher likelihood of an additional backer supporting a Kickstarter project if the project includes a video, if it is featured on the Kickstarter blog and if it is ranked as a

popular project by the platform (Kuppuswamy and Bayus, 2013). These results were confirmed also by the study of Xiao et al. (2014) focused on Kickstarter projects in the field of technology. They found that projects get supported by more money if the project homepage is well designed – the project page includes a video, the project is featured on the platform homepage and rewards are described in a detailed way (Xiao et al., 2014). The researchers investigated also the impact of the reward scheme on project performance and found an innovation project pledged more money if the maximum backing price is higher, which can also be interpreted as a signal for higher project quality (Xiao et al., 2014). Cordova, Dolci and Gianfrate (2015) found that the chance of project success is positively related to the dollar amount contributed per day – more contributions led to other contributions, supported also by the results of Kuppuswamy and Bayus (2013) that the number of new funders on a certain day positively influence the likelihood of an additional backer support. These findings were interpreted by the researchers as immediate WOM effects, which can be again contributed to the signaling theory. In sum, extant research on the topic shows that project success can be to a large extent linked to the quality of the innovation projects.

Another project-related success factor is the number of reward levels offered in the reward scheme, which was found to decrease crowdfunding project's performance (Xiao et al., 2014). Researchers contributed this finding to the choice overload theory, postulating that choices among equally attractive but mutually exclusive alternatives lead to conflict which is further increased with the number of options (Festinger, 1957; Lipowski, 1970, as cited in Xiao et al., 2014).

Hypothesis 3 (H3): *The number of reward levels in a project's reward scheme is negatively related to the probability of project success.*

The next success factor of interest is the number of project updates, which is regarded by some authors as project-related (Mollick, 2014) and by others as a proxy for peer-to-peer communication activity – "outwards" communication by the project creator to the community (Kuppuswamy and Bayus, 2013; Xiao et al., 2014). Empirical results are consistent in that the number of project updates is positively related to the crowdfunding project's performance and the likelihood of additional funding support (Block, Hornuf, and Moritz, 2018; Kuppuswamy and Bauys, 2013; Mollick, 2014; Xiao et al., 2014). Block, Hornuf, and Moritz (2018) investigated further the roles of different kinds of updates on the investment amount collected by a new venture based on data from two German equity crowdfunding portals - Seedmatch

and Companisto. The researchers found a positive effect of an increased number of words of an update on the pledged amount. In terms of content, a positive effect was linked to updates on new funding and business developments and updates on promotional campaigns run by the start-up, whereas updates on the start-up team, business model, cooperation projects and product development were not found to have a significant effect (Block, Hornuf and Moritz, 2018). Given the specifics of reward-based crowdfunding and its strong focus on products and projects, the researchers expressed expectations that updates with information about project and product developments would have particularly strong effects on reward-based crowdfunding projects (Block, Hornuf and Moritz, 2018).

In terms of the expected effect of project updates on the project performance, similarly to Mollick (2014), I regard the number project updates as a project-related factor, which is a signal for higher product quality, so I expect that the number of updates is positively related to project success. On the other side, I regard updates also as a proxy for "outward" peer-to-peer communication from the project creator to the community. Since updates are also a form of peer-to-peer communication, I expect the number of updates to be influenced by the general level of communication activity in terms of comments on the project – the more people involved and the more active they are in providing feedback, the more updates will be made by the project creator, taking into account community feedback. Moreover, I expect the number of comments to be positively influenced by the number of backers.

Hypothesis 4 (H4): *The number of comments on a project will increase with the number of backers.*

Hypothesis (H5): *The number of project updates is positively linked to the number of backers and the number of comments on a project.*

Hypothesis (H6): *The number of project updates positively influences the chances of project success.*

The second group of investigated success factors of crowdfunding projects is related to the community, including the community size and the communication activity. The number of funders involved in a project was found to be positively related to the probability of project success (Cordova, Dolci and Gianfrate, 2015). Researches also studied the effect of the size of the creators' social network on project success. Mollick (2014) found a positive relationship between the size of the creators' personal social network (number of Facebook friends) and

project success. These findings support a hypothesis that a large social network around a project is associated with a higher probability of project success.

Hypothesis 7 (H7): *The number of backers of a crowdfunding project is positively related to the probability of project success.*

Besides network size, the community can be characterized by the amount of communication activity taking place. Xiao et al. (2014) examined the effect of communication activity on the projects' crowding performance on Kickstarter and found that the number of comments has a positive significant effect on the amount of accumulated funds (Xiao et al., 2014), suggesting that the amount of communication activity between creators and backers positively influences project success.

Hypothesis 8 (H8): *The number of comments on a project is positively related to the probability of project success.*

All research hypotheses are summarized in a conceptual model in Figure 1.

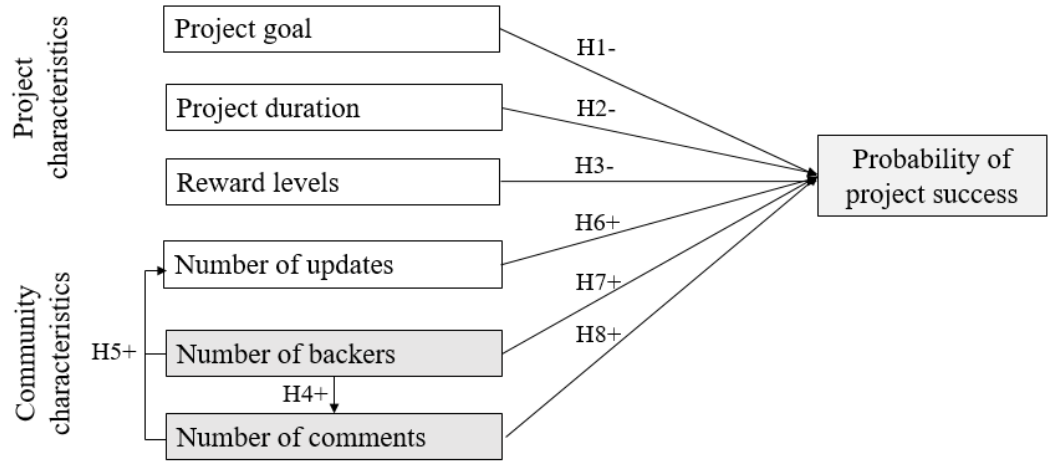

Figure 1. Model of research hypotheses

3. Data and Variables

The research hypotheses about success factors of crowdfunding-enabled innovation projects were tested using a dataset of Kickstarter projects which is publicly available for analysis. The sample consisted of $N_{original}$ = 45,957 project observations collected from May 2009 to June 2012. Kickstarter.com is a US-based online crowdfunding platform, which is the number one platform globally by the value of raised funds (Statista, 2016b) and I assume that it is

representative for the larger class of crowdfunding platforms. Since its launch in April 2009, 16 million people have backed a project on Kickstarter.com, 4,1 billion USD had been pledged and 157,390 projects have been successfully funded (Kickstarter, 2019). My second reason to choose a Kickstarter dataset is that detailed project data are documented and available and can be used for a quantitative analysis and testing of hypotheses.

Kickstarter uses an All-or-Nothing funding model – a creator creates a project and raises a pre-defined funding amount. The project is defined as successful only if the funding goal is reached - the pledged amount is equal or above the project goal. Otherwise, the project creator receives no funds, the funds are returned to the funders and the project is defined as failed. The projects in the examined initial dataset were distributed among five statuses – successful, failed, live (ongoing), canceled (by the user), and suspended with the following structure: Live, canceled and suspended projects accounted in sum for 10% of the projects, 50% of the projects were successful and 41% failed to collect the necessary funding. Since this study is interested rather in the distinction between successful and failed projects, a filtered sample was created including only successful and failed projects. The filtered sample contains $N_{filtered}$ = 41,965 project observations from which 55% were successful and 45% failed.

In the analysis I include seven independent variables that can be conceptually assigned to two categories: Project-related (defined by the project creator) and community-related factors (which do not depend on the creator but on the funder community). I include the project-related variables *project category*, *project duration* (in days), *project's funding goal* (in USD), *number of reward levels*, and *number of project updates*. With regards to the project subject, the Kickstarter projects are assigned to the categories: Art, Comics, Dance, Design, Fashion, Film & Video, Food, Games, Music, Photography, Publishing, Technology, and Theatre. Community-related variables, which are the variables of main interest of this study, include *the number of backers* (how many people pledged money for a project) and *the number of comments on the project*. The number of backers is a characteristic showing the size of the community network of funding supporters involved with the project. The number of comments can be used as a proxy for the communication activity or peer-to-peer interaction around a certain project, it includes comments by both backers and project creators.

Finally, *project status* is used as a dependent variable and was coded as a binomial variable (1 for a successful and 0 for a failed project).

The final sample contains projects covering a range of goals, reward levels and durations (Table 1). The average goal is 10,403 USD and a project is live for 40 days on average. The descriptive statistics for the dataset also indicate that there is a significant variation in the community measures – number of backers and comments, with average number of backers being 71 and average number of comments approximately 9.

	Project status	Project goal ($)	Project reward levels	Project duration (days)	Project updates	Community: Number of backers	Community: Number of comments
Min.	0.0000	0	0.000	1.00	0.000	0.00	0.00
1st Qu.	0.0000	1650	5.000	30.00	0.000	5.00	0.00
Median	1.0000	4000	7.000	32.09	2.000	25.00	1.00
Mean	0.5473	10403	7.951	40.23	4.338	71.03	8.31
3rd Qu.	1.0000	8800	10.000	49.07	6.000	61.00	3.00
Max.	1.0000	21474836	80.000	91.96	149.000	87142.00	19311.00

Table 1. Kickstarter dataset descriptive statistics

For the purpose of the analysis, the sample was split in a calibration and a test sample. A random sample of 80% of the observations (N_{cal} = 33 572) was drawn for training purpose of the constructed statistical models and the remaining 20% of the data (N_{test} = 8393) were used for model validation.

4. Empirical Analysis

In order to estimate the relationships between community- and project-related variables and project success, I build a series of logistic and linear regression models. Log-linear models were selected because of the binomial nature of the dependent variable. All statistical models were estimated with the R Studio software.

First, I investigated relationships among independent variables in order to be aware of mediation effects and to avoid biasedness of factor estimates. As per H4, it was expected that the community factor number of backers is positively related to the other community characteristic – number of comments on a project. With a higher number of people involved as project supporters, a higher level of communication activity was expected. Moreover, H5 assumes that the number of updates is influenced by the number of backers and the level of communication activity.

To assess these relationships among influencing factors, I estimated two linear regression models, with B0 being the model intercept and $B_{n\ (n = 1, \ldots,7)}$ being the regression coefficients:

(1) Comments = B0 + B1(Backers)

(2) Updates = B0 + B1(Comments) + B2(Backers)

In addition, correlation analysis was performed for these variables. Both expectations were confirmed. A high correlation was found between the number of backers and the number of comments (Corr. coef. = 0.71). The regression results suggest that 50% of the variance in the number of comments can be explained by the number of backers, supporting H4. One more backer is found to lead to an increase with 0,18 comments and the relationship is statistically significant (Table 2, Model (1)). The results from Model (2) indicate that the number of comments and the number of backers positively and significantly influence the number of updates of a project (Table 2, Model (2)), in support of H5. However, the explanation power of this model is low (R^2 = 0.01), indicating that the variance in the number of updates is explained by many other factors than the explored community characteristics.

As a next step, a series of logistic models were estimated to assess the influence of community-related and project-related factors on innovation projects success.
In the first model I include only the community characteristics of interest as project success predictors:

(3) P (Project success) = B0 + B1(Backers) + B2(Comments)

Additionally, two t-tests were made to check if there are significant differences among successful and failed projects with regard to these two variables. Successful projects were found to have significantly higher number of backers - 121 backers on average compared to 12 backers on average for failed projects ($t = -14.09$, $p < 0.001$). Successful projects received on average also a higher number of comments – 15 versus 0.9 comments on failed projects and the difference is significant ($t = -7.39$, $p < 0.001$). The logistic model including both community characteristics (Table 2, Model (3)) confirmed a significant positive relationship between the number of backers and probability of project success. A higher number of supporters from the community led to an increased probability of project success, in support of H7. However, opposed to expectations, the direction of influence of number of comments on the project on probability of project success was found to be negative and H8 was not

supported. These results may still be biased because of relevant project specific variables that are not included in this model.

As a next step, I estimated a model that includes also project set-up factors such as project funding goal, number of reward levels and project duration:

(4) P (Project success) = B0 + B1(Backers) + B2(Comments) + B3(Goal) + B4(Levels) + B5(Duration)

All these factors are initially set by the project creator and are not changed during the funding collection process. A significant relationship was found between funding goal and project duration and the probability of project success. The higher the project goal and the longer the project duration, the lower the probability of project success, supporting H1 and H2. When controlling for project set-up parameters, the number of backers kept its positive influence on success probability, while the number of comments lost significance.

The next Model (5) adds one more project specific variable – project updates:

(5) P (Project success) = B0 + B1(Backers) + B2(Comments) + B3(Goal) + B4(Levels) + B5(Duration) + B6(Updates)

DV	Comments	Updates	P (Project success)	P (Project success)	P (Project success)	P (Project success)
Model	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	-3.973	4.268***	-1.619***	-0.571***	-0.531***	-0.583***
Backers	0.175***	0.0005***	0.064***	0.121***	0.112***	0.111***
Comments		0.0016***	-0.019***	-0.0066	-0.0292***	-0.0092
Goal				-0.0005***	-0.0005***	-0.0005***
Levels				-0.0026	-0.0204***	-0.0262***
Duration				-0.0076***	-0.0098***	-0.0103***
Updates					0.128***	0.148***
CatComics						-1.100***
CatDance						0.6852***
CatDesign						-1.100***
CatFashion						-0.6106***
CatFilm&Video						0.2522
CatFilmVideo						0.4661***
CatFood						-0.5772*
CatGames						-1.751***
CatMusic						0.3277***
CatPhotogrpahy						-0.218*
CatPublishing						-0.7506***
CatTechnology						-1.306***
CatTheater						0.6799***
R^2	0.51	0.01				
AUROC					0.9699	0.9711

Table 2. Model estimation results

The variable project updates was included in a separate model, since, as discussed, its nature is different from other project-related factors in that it can be changed in accordance with feedback coming from the community during the funding collection process and it can be regarded as a form of outward communication. As it can be seen from the estimation of Model (b), the number of updates was significantly and positively influenced by both community characteristics. The results indicate that the more the updates on a certain project, the higher the probability of project success, supporting H6. When controlling for the number of updates, the level of commenting activity became again significant and was found to have a negative impact on the project success probability, again in contradiction to H8. One possible explanation is that the effect of comments that are in the form of constructive critique leading to project updates is already absorbed by the effect of the "updates" variable and the "pure" influence of the variable "comments" on the probability of project success remains negative and becomes significant. The part of the comments that is not related to project improvements may be in form of negative critique or useless discussion. The factor number of levels also became significant and was found to influence success probability in a negative way, supporting H3. The other factors kept their influences almost unchanged regarding direction and significance.

The constructed Model (5) was tested on predicting project success in the test sample using the AUC - ROC curve performance measurement method. ROC is a probability curve and AUC represents degree or measure of separability. It tells how much a model is capable of distinguishing between classes. The higher the AUC, the better the model is at predicting 0s as 0s and 1s as 1s. In this particular study, the higher the AUC, the better the model is at distinguishing between successful and failed projects. Model (5) turned out to be a good predictor of future project success, with AUROC (Area Under the Receiver Operating Characteristics) = 96.99%.

Finally, a model was estimated that includes a control for the project category variable in order to check if there is significant difference in project success probability across innovation categories:

(6) P (Project success) = B0 + B1(Backers) + B2(Comments) + B3(Goal) + B4(Levels) + B5(Duration) + B6(Updates) + B7(Category)

The results show that a project falling into a certain category has a significant effect on the probability of its success in almost all cases. Projects from the categories Dance, Film, Video, Music and Theater, which are all related to arts, have an increased probability of eventual success. These are also the categories with the lowest average goal. The categories with the highest goal on average are the categories Technology & Games and the probability of success is decreased if a project falls in these categories. It is interesting that when controlling also for the project category, all influence factors from the previous model keep the direction of their influence and their significance, except for the factor number of comments that again loses significance. This implies that a deeper investigation is needed of the role of communication activity on project success in different innovation categories.

The final Model (6) was again tested on predicting project success in the test sample and turned out as a good predictor of future project success, with AUROC = 97.11%.

A summary of hypotheses evaluation results is provided in Table 3.

Hypothesis	**Description**	
H1	The size of the project funding goal is negatively related to the probability of project success.	Supported
H2	The project duration is negatively related to the probability of project success.	Supported
H3	The number of reward levels in a project's reward scheme is negatively related to the probability of project success.	Supported
H4	The number of comments on a project will increase with the number of backers.	Supported
H5	The number of project updates is positively linked to the number of backers and the number of comments.	Supported
H6	The number of project updates positively influences the chances of project success.	Supported
H7	The number of backers of a crowdfunding project is positively related to the probability of project success.	Supported
H8	The number of comments on a project is positively related to the probability of project success.	Not supported

Table 3. Table of quantitative analysis results

5. Results and Discussion

The results from the analysis on the influence of community- and project-related factors on crowdfunding project success are consistent with previous research findings on success factors of crowdfunding campaigns (Block, Hornuf, and Moritz, 2018; Cordova, Dolci and

Gianfrate, 2015; Frydrych et al., 2014; Mollick, 2014; Kuppuswamy and Bayus, 2013; Xiao et al., 2014).

With regards to project definition factors, the higher the project funding goal and the longer the project duration, the lower the probability of success. The higher complexity of the reward scheme in terms of more the reward levels, the lower the success probability. Project creators can be advised to reduce project complexity and avoid high funding goals and long span of time. This can be included as a tip in the video guides which Kickstarter provides on its homepage in order to help project creators to build a successful funding campaign. Currently, the video guide on the topic of the reward scheme suggests types of attractive rewards, such as digital gadget or appreciation, and advise about shipping costs consideration (Kickstarter, 2019).

The one factor which can be influenced by project creators during the process – project updates, was found to have a significant positive influence on the probability of project success. The more the updates, e.g. refinements of the project, adding reward types or marketing campaigns, the higher the probability of success. Hence, project creators can be advised to take into account peer feedback and introduce project improvements, communicating them outward to the community.

With regards to the community characteristics – the bigger the community network size in terms of number of backers supporting a project, the higher the project success probability. The most interesting finding is that, when controlled for project updates, the higher the level of communication activity in terms of number of comments on the project, the lower the success probability. Since both types of inward and outward peer-to-peer communication are related, one possible reason could be that the positive effect of comments that are in the form of constructive critique leading to project updates is already absorbed by the positive effect of the "updates" variable in the model. The "pure" influence of comments on the probability of project success was found to be negative. It is possible that the part of the comments that is not related to project improvements constitutes negative critique or useless discussion. Another possible explanation can be found in the qualitative research on crowdfunding community participation of Gerber, Hui and Kuo (2012). According to their study, while creators were found to be primarily willing to engage with the crowd, one project creator described designing his page on Kickstarter to minimize the number of comments when he failed to meet his deadline and felt overwhelmed by the responsibility (Gerber, Hui and Kuo,

2012). These findings imply that not the amount of the communication activity but its various forms and direction have a positive or negative influence on successful innovation in a community setting where social interaction is one of the central characteristics. This is in line with previous findings of a double-edged impact of the network size and the amount and direction of the communication activity on the likelihood of successful innovation input by the participants in user innovation communities (Butler, 2001; Chan, Li and Zhu, 2015). Still in the rise of the virtual community phenomenon, Butler (2001) investigated the development and sustainability of online social structures. He found a both positive and negative effect of membership size and communication activity on the community structure's sustainability and saw as a challenge to maintain the balance of these opposing effects in order to sustain resource availability and benefits for community members. A larger social network is able to provide more resources to its members, but at the same time, with the increasing size and communication activity, it might get more difficult to find social support or relevant information. As Butler (2001) noted, "for an individual more communication activity is an improvement only if the benefits provided by that communication outweigh the costs of being exposed to it" (Butler, 2001). In the context of user innovation communities, Chan, Li, and Zhu (2015) found that a high amount of "outward" peer-to-peer commenting activity positively influences user's likelihood and extent of subsequent idea generation, whereas a larger "inward" network size (the number of received comments and feedback on the user's own idea) negatively influences subsequent idea generation. The researchers offered a possible explanation that receiving comments from more peers costs the users more effort and time to understand, evaluate, and respond, distracting them from their innovation focus while also counteracting any positive effects or benefits of the large network in the idea generation process (Chan, Li, and Zhu, 2015).

Two implications can be outlined with regards to the virtual crowdfunding community characteristics as success factors for crowdfunding projects' success. First, attracting higher number of diverse participants in the community to support the projects can increase the share of successful projects. Second, the higher level of peer-to-peer interaction doesn't necessarily lead to a higher probability of success. It can be recommended to stimulate commenting activity in the form of constructive critique that leads to updates and improvements of the subject of innovation. E.g., an improvement suggestion feature can be added to the platform which also assigns improvement-oriented comments to various categories: New features, Marketing, Design, etc.

This study provides a small contribution to the larger topic of the proper design and the way of steering of network size as well as inward and outward peer-to-peer interactions in virtual innovation communities for capturing the innovation power of the crowd. The proposed models still leave out some important explanatory variables. For example, the models do not include a variable for project geography. There is a branch of crowdfunding literature, which focuses on the impact of geography on the probability of crowdfunding project success and findings show that geography is important in the crowdfunding context, since funders proximity to creators is positively correlated to project success (Mollick, 2014; Agrawal, Catalini and Goldfarb, 2015). However, given the high prediction power of the presented models, the paper offers a good compromise between model complexity and model prediction power in order to forecast crowdfunding project success. Building up on extant research on success factors in crowdfunding communities, the study contributes to the literature by investigating deeper the role of the interactions in the community trough examining the interrelations among independent variables and presents some more subtle relationships between communication activity and project success. Since results showed significant differences between project success in different project categories, future research can be made with a focus on the success factors and the role of virtual community characteristics for project success in specific innovation categories.

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