ISSN: 2230-9926

Available online at http://www.journalijdr.com

IJDR

International Journal of Development Research
Vol. 11, Issue, 06, pp. 47650-47656, June, 2021
https://doi.org/10.37118/ijdr.22081.06.2021

RESEARCH ARTICLE OPEN ACCESS

CROWDFUNDING FOR TECHNOLOGICAL INNOVATION OF MICRO & SMALL ENTERPRISES IN BRAZIL

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ARTICLE INFO

Article History:
Received 06th March, 2021
Received in revised form
17th April, 2021
Accepted 28th May, 2021
Published online 20th June, 2021

Key Words:
Crowdfunding; Innovation Funding; Technological Innovation; Micro & Small Enterprises.

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ABSTRACT

The research intent was to analyze the main objectives of crowdfunding campaigns for technological innovation of micro and small enterprises in Brazil. The research included multiple case studies and surveys. Interviews were conducted with those responsible for crowdfunding campaigns, for technological innovation, and data available on the platforms were collected. The data were treated through qualitative content analysis, using the Atlas-ti software, identifying objectives of crowdfunding campaigns for technological innovation. Based on the list of objectives, an online questionnaire was structured and sent to those responsible for crowdfunding campaigns for technological innovation projects. Then, the data were analyzed using the statistical software SPSS. The results indicate that the main objectives of crowdfunding campaigns, in various models, for technological innovation, are related, in addition to financial issues, to marketing issues, and to the objective of testing their use for product financing. It is observed that crowd funding is an alternative funding source for innovation, also contributing to market issues, favoring entrepreneurship, even in times of recession, and its use can help in the resumption of the economy in the post-Covid-19 period.

Citation: ***Marcia de Souza Bronzeri and João Carlos da Cunha.*** "Crowdfunding for Technological Innovation of Micro & Small Enterprises in Brazil", *International Journal of Development Research*, 11, (06), 47650-47656.

INTRODUCTION

Technological innovation involves risk and uncertainty (Tidd et al, 2008) which tend to make it difficult to obtain financial resources from traditional sources, especially for micro & small enterprises (MSE) (Demirel and Parris, 2015), jeopardizing, thus, their entrepreneurial initiatives (OECD, 2018). Crowdfunding emerges as an alternative to traditional funding, even for high-risk projects (Profatilov et al., 2015), mainly for MSE. Fundraising, facilitated by crowdfunding, is relevant in itself, however, this need not be the only objective of crowdfunding campaigns, even in the business environment (Mollick, 2014). Thus, the identification and dissemination of the objectives that can be achieved through crowdfunding for technological innovation projects tend to contribute to the intensification of the crowdfunding adoption, enabling the development of innovations, improving the MSE performance, with positive reflexes for the economy. Therefore, this research arose from the following question: what are the objectives, in addition to the financial ones, that can be achieved through crowdfunding, in its different models, for technological innovation projects of product, service and process ?. Therefore, the general objective of the research was to analyze the main objectives of those responsible for crowdfunding campaigns for technological innovation of product, service and process for SMB in Brazil. The specific objectives were to verify the objectives expected by those responsible for crowdfunding campaigns for technological innovation; and to identify the main objectives expected and accomplished, through the campaigns. The study presents, in addition to this introduction, the literature review on innovation, funding and crowdfunding. Afterwards, the methodological procedure used in the research is described. Then, the presentation and analysis of the results are shown, followed by the concluding remarks.

Innovation funding: Although innovation involves risk and uncertainty, it is an important competitive source for the enterprises (Tidd et al, 2008), being necessary even if only to maintain their position in the market (Lundvall, 2010). In this research, technological innovation was considered, which can be of product (good or service) or process nature, as defined by Brazilian Federal Law 11.196, in paragraph 1 of section 17-VI (Brazil, 2005). This type

of innovation is an expensive and time-consuming process that involves risk and uncertainty (Tidd et al, 2008), making the process of innovation more challenging. Among the various challenges, the high costs of innovation, excessive economic risks and the scarcity of appropriate funding sources stand out, which are repeatedly indicated as related to innovation in Brazil (IBGE, 2016). Thus, the facilitation of obtaining financing involves an important obstacle to innovation.
At the beginning of a business venture, in addition to own resources, sometimes part of the financial resources is obtained from family and friends and, throughout the evolution of MSE, there are other funding needs (Prijadi, et al., 2020). However, MSE have less access to financial resources from traditional sources, due to the difficulty of presenting real guarantees (Demirel and Parris, 2015). Thus, crowdfunding can represent an important source of innovation funding. The following are some aspects of crowdfunding.

Crowdfunding in the business context: Crowdfunding corresponds to the efforts of individuals or enterprises to raise financial resources from a relatively large number of people, who contribute small amounts, to support a specific project, usually using the internet (Mollick, 2014; Ahlers et al., 2015). Initially, crowdfunding was used for artistic and cultural enterprises, advancing to finance business projects (Bruton et al., 2015; Giudici et al., 2017;), becoming a source of external financing, filling a gap left by venture capital, especially in the early stages of an enterprise (Frydrych and Kinder, 2015; Salomon, 2016). A major distinction between crowdfunding and traditional funding sources is the involvement of supporters in the project's execution process, as a co-creation of value (XU et al., 2016). This involvement can occur in the ideation stage, which allows for improvement, especially in technological product innovation (Gerber and Hui, 2013). Crowdfunding has a variety of models (Mollick, 2014), as presented next.

Crowdfunding models: There are 4 main crowdfunding models: donation-based; reward-based; lending-based; and equity-based. The donation-based model (donation crowdfunding) has supporters acting as philanthropists, with no expectation of return from donations (Mollick, 2014; Belleflamme et al., 2015; Gleasure and Feller, 2016).
In the reward-based model (reward crowdfunding), funders receive a tangible or intangible reward for their support. The reward can be the product / service for which the crowdfunding is being done, with the funders being the initial customers (Mollick, 2014), in a pre-sale form. In such a way, obtaining the product or service before the official launch-to-the-market represents an important motivation for project financing (Profatilov et al., 2015). The lending-based model (lending crowdfunding) has supporters who offer financial resources like a loan, with an expected return under a pre-defined interest rate (Mollick, 2014; Gleasure and Feller, 2016). In the equity-based model (equity crowdfunding), investors fund the project, with the expectation of future participation in the enterprise's activity (Mollick, 2014; Profatilov et al., 2015).

Each model is best adjusted to a certain stage in the life cycle of financing an enterprise, in which the amounts of money needed are different (World Bank, 2013). The crowdfunding models based on donation, reward, lending and equity correspond to the increasing order of phases of an enterprise and the respective volume of financial resources needed (World Bank, 2013). Funding, in general, can be through the All or Nothing (AON) model or through the Keep it All (KIA) model, options that define the action to take, in case the campaign fails to raise the previously defined necessary amount (target value) (Gerber and Hui, 2013; Belleflamme et al., 2015). In the AON model, if the target value is not reached, the person responsible for the campaign does not receive any money that was promised, and the money goes back to the supporters (Gerber and Hui, 2013; Belleflamme et al., 2015; Giudici et al., 2017). In the KIA model, the person responsible for the campaign receives all funds raised, even if it has not reached the target value (Gerber and Hui, 2013). However, although crowdfunding is a way of raising financial resources, some studies indicate other objectives, as shown next.

Crowdfunding far beyond the money: Even in the business context, crowdfunding can have other objectives, in addition to the financial one. Box 1 presents objectives observed in research on crowdfunding for projects in general. It is observed the indication of specific crowdfunding models for certain objectives. This question will be taken up again, in the presentation and analysis of the results regarding the main expected and accomplished objectives. Based on the identified crowdfunding aspects, methodological procedures were defined to achieve the research objectives, as presented next.

Methodological procedures: The research comprised multiple case study and survey. Interviews were carried out to identify objectives expected by those responsible for crowdfunding campaigns for technological innovation, and data were collected available on the campaign web pages, on the platforms. The data obtained in this phase were also used in the analysis of the survey results. Based on the expected / accomplished objectives, a survey was conducted with the application of an online questionnaire to register which were the main expected and accomplished objectives, through crowdfunding campaigns for technological innovation, launched and concluded between 2010 and 2016, by MSE or individuals, in the different crowdfunding models, for technological innovation of product, service or process in Brazil. The campaigns for technological innovation were identified through the data available on the crowdfunding platforms, according to the list resulting from the compilation and updating of the platforms indicated by Monteiro (2014), Justo (2015) and Riffel (2016).

A total of 147 campaigns were identified as potentially related to technological innovation. The campaigns were classified by crowdfunding model, being 105 in the reward-based model; 40 in the equity-based model; and 2 in the lending-based model. The cases to be studied were chosen from the 147 campaigns initially identified, seeking to have campaign representatives from each of the crowdfunding models. There was also an indication, by an interviewee, of a Brazilian campaign launched abroad, which proved to be relevant to the research. The number of cases was defined by the saturation or redundancy technique, aiming to provide further exploration of the theory, seeking new data until these began to repeat themselves (Glaser and Strauss, 1967). Responsible for 22 campaigns were contacted, which resulted in interviews with 9 responsible for crowdfunding campaigns for technological innovation, corresponding to 11 campaigns – because, in 2 cases, the same person launched 2 campaigns.

The interviewees were coded according to the chronological sequence of the interviews, with R1 representing the first responsible person interviewed and R9 the last one. A letter (A or B) was included, to identify the campaigns of the same person in charge: R1A; R1B; R2; R3A; R3B; R4; R5; R6; R7; R8; R9. And the suffix “reward” and “equity” was included to indicate the models based on reward and equity, respectively, relative to the models of the studied campaigns. The interviews were carried out through a communication software over the internet, with voice and video, recorded with the prior authorization of the interviewees, and transcribed in full. Qualitative content analysis was performed (Bardin, 2006), using the Atlas.ti software, identifying the expected and accomplished objectives through the campaigns.

Then, a survey was carried out, with a self-applied online questionnaire, sent to those responsible for the crowdfunding campaigns. Of the 147 campaigns, no active contact form was found for seven. Thus, questionnaires were sent to those responsible for 140 campaigns. Of these, a sample was obtained by voluntary adherence of 63, among which 6 questionnaires were invalidated for not meeting the research criteria. Hence, the survey gathered 57 valid questionnaires. The questionnaire was prepared based on the list of objectives for crowdfunding campaigns for technological innovation, identified through the analysis of information content. Data were also collected from the campaigns and from the enterprise responsible for the campaigns, which were used in the analysis of the survey data.

For the data collection on the objectives, a 7-point scale was used based on the semantic differential developed by Osgood et al. (1957). For each of the objectives of crowdfunding campaigns for technological innovation, the person responsible for the campaign was asked to indicate the degree of importance, on a scale of 7 points, in a continuum supported between the extremes of 1 (minimum importance) to 7 (maximum importance), including the "not considered" option. For each of the objectives, the indication of the degree of achievement was also requested, on a 7-point scale, on a continuum supported between the extremes of 1 (minimum achievement) to 7 (maximum achievement), including the option of "not accomplished". The data were analyzed using the statistical software SPSS, including descriptive statistics, and also the tests Kruskal-Wallis and Mann-Whitney, Spearman's Correlation Coefficient and Chi-square test. The level of significance used was 0.05.

RESULTS

Through the content analysis of the interviews, it was possible to identify that, in addition to the objectives expected for crowdfunding campaigns in general (Box 1), there are specific objectives for technological innovation projects, related to obtaining financing not accessible by traditional funding sources and testing the use of crowdfunding for product financing. The general and specific objectives were the basis of the questionnaire.

Main objectives of crowdfunding for technological innovation projects: In the questionnaire, all the objectives for crowdfunding campaigns in general, listed in Box 1, were added, plus the specific objectives for campaigns for technological innovation, identified in the content analysis. For each objective, a classification was requested regarding the degree of importance, on a scale of 7 points in a continuum supported between the extremes: 1 (minimum importance) to 7 (maximum importance), including the option of "not considered"; and the degree of accomplishment from 1 (minimum accomplishment) to 7 (maximum accomplishment), including the option of "not accomplished". The questionnaire also included questions related to the campaign and the enterprise or responsible person. The results are presented below. Table 1 indicates the use of crowdfunding for technological innovation as of 2012. Among the crowdfunding enterprise in Brazil, the oldest was opened in 2010. There is an increase in the number of campaigns between 2014 to 2016, a period of economic recession in Brazil, according to Barbosa Filho (2017). The campaigns launched in the years 2015 and 2016 correspond to 78% of the total campaigns in the sample, indicating the intensification of the use of this type of financing.

The lowest target value was R$ 1K and the highest was R$ 1M (Table 2). This shows the use of crowdfunding to capture both smaller and larger volumes of financial resources. The predominant crowdfunding model was based on reward. For technological innovation projects, this model is ideal, mainly as a pre-sale. The Mann-Whitney test indicated that there was a statistically significant difference (sig = 0.000) in the average of the target value between the reward crowdfunding (R$ 37,443.08) and the equity crowdfunding (R$ 398,750.00), consistent with the indication of the World Bank (2013) that equity crowdfunding involves higher values than reward. One of the reward crowdfunding campaigns had a higher target value, due to the experience with a previous campaign, which made it possible to better dimension the product demand (R3B_reward).

Fundraising was a common objective of crowdfunding campaigns. Since reaching the target value is a usual measure for evaluating campaigns (Ahlers et al., 2015), analyzes are presented regarding the percentage of funding (ratio between the amount raised and the target value), by crowdfunding model, purpose, size and type of innovation. Of the campaigns in the sample, 12 (21%) did not reach the target value, and 45 (79%) did it (Table 3). In all, 14 campaigns (25%) had a percentage of funding between 100% to 103%, 11 (19%) had a fundraising rate between 104 to 110%, 20 (35%) had a fundraising rate above 110% and, of these, 6 had fundraising equal to or greater than 200%, a result similar to that observed by Mollick (2014) for crowdfunding campaigns in general.

As for the percentage of funding, concerning the crowdfunding model, the Mann-Whitney Test indicated that there is a statistically significant difference (sig = 0.026). Reward crowdfunding averaged 154.48% of funding, while equity crowdfunding averaged 93.44%. It is noteworthy that the funding in the equity crowdfunding can be less than 100%, and, of the 12 campaigns in the sample that did not reach the target value, half was in this model, while the predominant funding model for the reward crowdfunding campaigns was AON, which requires the capture of at least 100% of the target value. Half of the reward crowdfunding campaigns were rewarded with the product / service itself financed, as a pre-sale, which generates motivation for project financing, as indicated by Profatilov et al. (2015).

Of the campaigns in the sample, 70% were for-profit, confirming the use of crowdfunding for entrepreneurial and business projects, as indicated by Giudici et al. (2017). This is reinforced by the result of the Mann-Whitney Test (sig = 0.135), which indicates that there is no statistically significant difference in the average percentage of funding between for-profit and non-profit campaigns. It is opportune to present the analysis of the correlation between the target value and the percentage of funding. The Spearman correlation test (sig = 0.131) indicated that the percentage of capture is independent of the target value. As shown in Table 4, 43 campaigns were linked to micro businesses and 6 to small businesses, reinforcing that crowdfunding is an alternative funding source for innovation, especially for smaller enterprises. A total of 8 campaigns are not linked to an enterprise, as there is a crowdfunding model that allows campaigns to be launched by individuals (Mollick, 2014; Ahlers et al., 2015), as in the case of reward crowdfunding.

The Kruskal Wallis test (sig = 0.105), indicated that there is no statistically significant difference in the average of the percentage of capture according to size. Thus, even campaigns launched by individuals have the potential to raise funds through crowdfunding. As for innovation, according to the Kruskal Wallis Test (sig = 0.131), there is no statistically significant difference in the average percentage of funding by type of innovation. However, 6 campaigns with the highest percentage of funding were in the reward model, such as pre-sale of the product or service. Additionally, the Chi-square test indicated that there was no difference between the type of innovation and the crowdfunding model (sig = 0.440), nor between the type of innovation and the purpose (sig = 0.224). Thus, the crowdfunding model does not depend on the type of technological innovation, as well as the type of innovation does not depend on whether the project has a profitable purpose or not.

As for the uptime, Table 5 shows that about 9% of the campaigns were launched in the year prior to the opening of the enterprise and approximately 28% in the same year that the enterprise was opened, highlighting the importance of crowdfunding for entrepreneurship. Of the campaigns launched in years after the opening of the enterprise, there were campaigns launched even in the 13th year after the opening of the enterprise, indicating that even MSE with longer activity have in crowdfunding a funding source for innovation. There is an increasing use of crowdfunding for technological innovation of product, service and process, for projects guided or not for profit, even in times of economic crisis. The models suitable for technological innovation are reward, equity and lending, regardless of the type of innovation. When the campaigns were launched, the innovations had already been developed with their own resources and, in some cases, also with resources from government sources. All of them had, at least, a prototype, with cases in which the innovation was completely concluded, without observing the co-creation indicated by Xu et al. (2016). As for the percentage of funding, there is no statistically significant difference in the average of this value between campaigns for product, service and process innovation.

Box 1. General crowdfunding campaign goals

Objectives	Authors	crowdfunding model
Raising financial resources	Roggan (2015)	equity-based
	Gerber and Hui (2013)	all models
Obtaining initial funds for the implementation of the project without the participation of external investors	Profatilov et al. (2015)	reward-based
Performing market pre-test	Lehner et al. (2015)	reward-based
Promoting the product, service, project or enterprise	Profatilov et al. (2015), Mollick (2014)	reward-based
	Mollick (2014)	donation-based
Obtaining information about the demand for a product / service under development or for an innovative product / service	Agrawal et al. (2014), Profatilov et al. (2015), Mollick (2014), Roggan (2015)	reward-based
	Mollick (2014)	donation-based
Leveraging the market	Lehner et al. (2015)	reward-based
Obtaining personal or professional approval	Gerber and Hui (2013)	reward-based
Exploring crowdfunding as a distribution channel	Lehner et al. (2015)	reward-based
Demonstrating investment viability for potential investors	Roggan (2015)	equity-base
Building connections and relationships with potential investors	Gerber and Hui (2013)	reward-based
	Roggan (2015)	equity-based
Getting benefits of increased investors, customers or users	Roggan (2015)	equity-based
Learning new skills in areas outside professional experience	Gerber and Hui (2013)	reward-based

source: own authorship

Table 1. Distribution of campaigns by year of launch

campaign launch year	campaigns (quantity)	percentage
2012	2	3%
2013	2	3%
2014	9	16%
2015	21	38%
2016	23	40%
total	57	100%

source: research data

Table 2. Distribution of campaigns by target value and crowdfunding model

target value	reward	equity	loan	total
R$ 1K to R$ 20K	16	0	0	16
R$ 20K to R$ 40K	12	0	1	13
R$ 40K to R$ 100K	11	0	0	11
R$ 100K to R$ 250K	0	6	0	6
R$ 250K to R$ 350K	1	4	0	5
R$ 350K to R$ 1M	0	6	0	6
total	40	16	1	57

source: research data

Table 3. Distribution of campaigns by the percentage of the goal reached, crowdfunding model and purpose

Percentage of the goal reached	Crowdfunding model			Purpose of the project		
	Reward	Equity	Lending	Profit	Non-Profit	Total
9% to 99%	5	6	1	11	1	12
100% to 103%	9	5	0	11	3	14
104% to 110%	10	1	0	5	6	11
111% to 150%	7	2	0	6	3	9
151% to 199%	3	2	0	4	1	5
200% to 1206%	6	0	0	3	3	6
total	40	16	1	40	17	57

source: research data

Table 4. Distribution of campaigns by the percentage of the goal reached, size and type of innovation

Percentage of the goal reached	Size			Innovation type			
	Micro	Small	Individual	Product	Service	Process	Total
9% to 99%	7	3	2	4	6	2	12
100% to 103%	12	2	0	4	7	3	14
104% to 110%	8	1	2	4	6	1	11
111% to 150%	7	0	2	3	4	2	9
151% to 199%	4	0	1	3	1	1	5
200% to 1206%	5	0	1	5	1	0	6
total	43	6	8	23	25	9	57

Source: research data

Table 5. Distribution of campaigns by uptime

campaign launch	campaigns (quantity)	percentage
Year prior to the opening of the enterprise	5	9%
Same year as the opening of the enterprise	16	28%
Year following the opening of the enterprise	12	21%
Years after the opening of the enterprise	16	29%
Not linked to enterprise	8	14%
total	57	100%

source: research data

Table 6. Main objectives expected and accomplished

Objective	expected		accomplished	
	degree of importance	Frequency (descending order)	degree of achievement	frequency
a. Raising financial resources	7	43	7	40
b. Obtaining initial funds for the implementation of the project without the participation of external investors	7	29	7	28
c. Obtaining financing not accessible by traditional funding sources	7	23	7	24
d. Promoting the product, service, project or enterprise	7	20	7	16
e. Performing market pre-test	7	17	7	21
f. Obtaining information about the demand for a product / service under development or for an innovative product / service	7	15	7	14
g. Testing the use of crowdfunding for product financing	7	12	7	14

Source: research data

Table 7. Objectives with a higher degree of importance and achievement and number of campaigns

Crowdfunding model	Objectives													
	a		b		c		d		e		f		g	
	exp	acc	exp	acc	exp	acc	exp	acc	exp	acc	exp	acc	exp	acc
Reward-based	30	21	26	16	14	9	16	9	15	12	12	6	9	5
Equity-based	13	11	3	3	9	8	3	3	2	2	3	3	3	3
Lending-based	-	-	-	-	-	-	1	-	-	-	-	-	-	-
total	43	32	29	19	23	17	20	12	17	14	15	9	12	8
acc/exp	74%		66%		74%		60%		82%		60%		67%	

source: research data

However, there is a possibility of a higher percentage of funding in the reward model, such as pre-sale of product or service. Crowdfunding can be used to meet different levels of financial resources, and the target value does not affect the fundraising capacity. The reward model, in general, involves lower target values than the equity model, however it can reach higher percentages of funding, especially if it is in the form of pre-sales. The equity crowdfunding and the lending crowdfunding comprises projects for profit, launched by regular enterprise, while the reward crowdfunding comprises projects guided or not to profit and campaigns launched by enterprises and by individuals. There is no statistically significant difference in the percentage of funding between projects for profit and non-profit purposes, as well as there is no statistically significant difference in the average percentage of funding between projects launched by enterprises and individuals. However, campaigns launched by individuals have the potential to exceed the target value, especially when used as a pre-sale. It is observed that the fact that a campaign for technological innovation is not found in the donation-based model distances the patronage characteristic from the crowdfunding. Thus, there is an expectation of increasing the use of this type of financing to meet the capital needs of business projects, even for profit. As for the objectives for crowdfunding campaigns for technological innovation projects, among the most important ones are those related to fundraising and also to other aspects, as can be seen in Table 6. The expected objectives that had the most frequency was the same with the most frequency among those accomplished, all with the maximum degree of importance and accomplishment. The main objectives include financial and marketing issues and also the objective of testing the use of crowdfunding for innovation.

Of the campaigns that had these objectives as the most important, not all reached the highest degree of achievement. Table 7 shows the total number of campaigns that had each of these objectives among the expected ones of greatest importance (exp), by crowdfunding model and, of these, how many achieved the highest degree of accomplishment (acc). Raising financial resources (objective a) – this is expected in crowdfunding campaigns of all models (Gerber and Hui, 2013). Of the 43 campaigns that had this as one of the main objectives, 32 (74%) reached the highest degree of achievement, for innovation projects of product, service and process. Among the equity crowdfunding campaigns, 11 (85%) reached the highest degree of achievement, while of the reward campaigns, 21 (70%) reached the highest degree of achievement of the objective. Obtaining initial funds for the implementation of the project without the participation of external investors (objective b) – for reward crowdfunding campaigns (Profatilov et al., 2015), being the objective with the highest degree of importance for 26 campaigns in this model. The reward crowdfunding is perceived as adequate for fundraising without the participation of external investors, as expressed by the person responsible for a campaign.

We thought it was reasonable not to sell the stake in the enterprise, as it was not so common at the time. So, at the time, we thought that crowdfunding would be more interesting for people to be able to buy [the product] in advance than a percentage of the enterprise itself (R2_reward).

However, 3 equity crowdfunding campaigns also had this as one of the most important objectives. This is because there is a perception that this model does not compromise the enterprise's control.

At the time, to convert the bonds into shares, we will have to go public, but it is a percentage that does not compromise the power of decision, which is different from when you raise it through seed capital or angel capital, that they stay, sometimes, with most of the control of the enterprise (R8_equity).

Of the 29 campaigns that had this as one of the most important objectives, 19 (66%) had the highest degree of achievement, in innovation projects for product, service and process. Among the equity crowdfunding campaigns, 3 (100%) reached the highest degree of achievement, while 16 (62%) of the reward campaigns reached the highest degree of objective achievement.

Obtaining financing not accessible by traditional funding sources (objective c) – although this is generally an objective related to innovation funding, as it involves mechanisms different from traditional financing, in the analyzed literature on crowdfunding this does not appear as one of the objectives of using this type of financing. But in the case of campaigns for projects of technological innovation, this was indicated as one of the most important objectives by those responsible for 23 campaigns, 14 in the reward-based model and 9 in the equity-based model. This is because innovation funding faces greater difficulties, especially for newly formed enterprises. Of the 23 campaigns that had this objective as one of the most important, 17 (74%) reached the highest degree of achievement, in innovation projects for product, service and process. Among the equity crowdfunding campaigns, 8 (89%) reached the highest degree of achievement, while of the reward campaigns, 9 (64%) reached the highest degree of achievement of the objective.

Promoting the product, service, project or enterprise (objective d) – expected by reward crowdfunding campaigns (Mollick, 2014; Profatilov et al., 2015) and donation crowdfunding campaigns (Mollick, 2014). Among the reward crowdfunding campaigns, 16 had this as one of the main objectives, as there is an indication of alignment between this objective and such crowdfunding model. Disclosure also proved to be an objective for a campaign related to the technological innovation project of a non-profit service, to make the innovative service available free of charge. “The crowdfunding campaign was based on the understanding that the project would have an impact on the public. [...] For us, it was more to start the project” (R9_reward). Among the equity crowdfunding campaigns, 3 had this as one of the most important objectives, and also 1 in the lending-based model, which may be related to the expectation of obtaining support from investors, resulting from the disclosure promoted by the campaign. In fact, disclosure of the product, service, project or enterprise was indicated as one of the most important objectives for crowdfunding campaigns of innovation projects for product, service and process. Of the 20 campaigns that had this as one of the most important objectives, 12 (60%) had the highest degree of achievement, for product and service innovation projects. The 3 equity crowdfunding campaigns reached the highest degree of achievement, confirming that this disclosure is also a contribution to campaigns of this model. Of the 16 reward crowdfunding campaigns, 9 (56%) reached the highest degree of achievement. The campaign on the lending-based model had only this objective as the most important, however, the degree of achievement was 4, on a scale between 1 (minimum achievement) and 7 (maximum achievement).

Performing market pre-test (objective e) – expected by reward crowdfunding campaigns (Lehner et al., 2015) is one of the most important objectives for 15 campaigns in this model. For reward crowdfunding campaigns for product innovation, configured as pre-sales, this objective is especially important, as demonstrated by those responsible for campaigns in this model. “So, at the same time, we managed to put our customers to test, and we also managed to get resources to continue the work and launch the product on the market” (R1B_reward). Aiming, thus, to “test the market” (R4_reward). As crowdfunding in the reward-based model “is an interesting way to be able to prove the market by raising money” (R5_reward). However, this was also a major objective for 2 equity crowdfunding campaigns. This may be due to the financing reflecting the approval of investors, regarding the innovation developed or under development. Of the 17 campaigns that had this as one of the most important objectives, 14 (82%) had the highest degree of achievement of innovation projects for product, service and process. The 2 equity crowdfunding campaigns had the highest degree of achievement of this objective. Of the 15 reward crowdfunding campaigns, 12 (80%) reached the highest degree of achievement. Obtaining information about the demand for a product / service under development or for an innovative product / service (objective f) – expected by reward crowdfunding campaigns (Agrawal et al, 2014; Mollick, 2014; Profatilov et al., 2015; Roggan, 2015) and donation (Mollick, 2014). This was one of the main objectives for 12 reward crowdfunding campaigns, proving to be especially important for product innovation projects, such as a pre-sale, as reported by those responsible for campaigns of this model. "So, we have the advantage to analyze the demand, idea, price, a series of things, anyway" (R3A_reward; R3B_reward). This was also one of the most important objectives for 3 equity crowdfunding campaigns, as the financing may reflect the approval of the innovation. Of the 15 campaigns that had this as one of the most important objectives, 9 (60%) had the highest degree of achievement in innovation projects for product, service and process. Of the 12 reward crowdfunding campaigns, 6 (50%) reached the highest degree of achievement, while the 3 equity ones reached the highest degree of achievement, showing that obtaining information about the demand for product / service is a contribution of crowdfunding also for campaigns in the equity-based model.

Testing the use of crowdfunding for product financing (objective g) – specific for campaigns of technological innovation projects, according to content analysis. The survey confirmed this purpose as one of the most important objectives for 9 reward crowdfunding campaigns and 3 for equity. The person responsible for 2 reward crowdfunding campaigns reported that the first campaign was launched to evaluate how this type of product financing would be, aiming at the subsequent launch of a campaign for higher value equipment, also in the reward-based model (R1A_reward; R1B_reward). The difficulty in obtaining information about crowdfunding for product financing was observed by the person responsible for campaigns in the reward-based model, for product innovation projects, who stressed that it is a different process from crowdfunding for other projects, such as book financing (R3A_reward; R3B_reward). It should be noted that this objective was indicated as of greatest importance for crowdfunding campaigns of innovation projects for product, service and process, revealing the need to generate knowledge about the use of this type of financing for technological innovation projects. Of the 12 campaigns that had this as one of the most important objectives, 8 (67%) reached the highest degree of achievement of innovation projects for product and service. The 3 equity crowdfunding campaigns reached the highest degree of achievement, and of the 9 reward campaigns, 5 (56%) reached the highest degree of achievement.

This objective reached a greater degree of achievement even for service innovation campaigns, despite the indication that it is specific for crowdfunding for technological product innovation, as it differs from projects of artistic and cultural purposes, for which crowdfunding was initially used, as expressed by Giudici et al. (2017) and Bruton et al. (2015). Among the 7 most important objectives, 3 are related to financial issues. However, the objective of performing a pre-test of the market had a higher percentage of accomplishment among the campaigns that had it as one of the most importance, even in the equity-based model. It is observed that the main non-financial objectives, in general expected by reward or donation crowdfunding campaigns, were also of greater importance for equity crowdfunding campaigns, with a higher percentage of campaigns that reached a maximum degree of achievement.

Conclusion

The research intended to analyze the main objectives, in addition to financial funding, of the launch of crowdfunding campaigns of technological innovation for product, service and process, for MSE in

Brazil. The research was developed with multiple case study and surveys. Data were collected from those responsible for crowdfunding campaigns for technological innovation. The results indicate that the main objectives expected by those responsible for the sampled campaigns, for the models based on reward and equity, in decreasing order of frequency, were: a) raising financial resources; b) obtaining initial funds for the implementation of the project without the participation of external investors; c) obtaining financing not accessible by traditional sources of financing; d) promoting the product, service, project or enterprise (also for the campaign on the lending-based model); e) performing market pre-test; f) obtaining information about the demand for a product / service under development or for an innovative product / service; and g) testing the use of crowdfunding for product financing. These were also the goals with the highest frequency of achievement. It is noteworthy that the objectives "c" and "g" are specific to crowdfunding campaigns for technological innovation, and the objective of testing the use of crowdfunding for product financing highlights the need to generate knowledge about crowdfunding for technological product innovation, to which this study contributes. As for the type of innovation, the objective of promoting the product, service, project or enterprise was shown to be related to product and service innovation. The other objectives showed potential for maximum realization for product, service and process innovation. These results contribute, in a practical way, by presenting that the crowdfunding models based on reward, equity and lending, are adequate to the funding of technological innovation projects for product, service and process, with the indication of objectives with greater potential for achievement.

From a theoretical point of view, the research contributes by adding crowdfunding to alternative funding sources for technological innovation, even in periods of economic recession, including by individuals, proving to be important to foster entrepreneurship. This may be an alternative for the recovery of the post-pandemic economy of Covid-19, depending, however, on public policies of incentive and promotion, in the different phases of the development of the innovation development process. And, as future research, it is suggested to analyze the use of crowdfunding in the resumption of the economy, after the pandemic. One of the limitations of the research is the reduced number of crowdfunding campaigns for technological innovation, which made it impossible to use systematized procedures to randomly define the sample. Added to this is the low rate of adherence to the invitation to answer the questionnaire. Even so, the results bring relevant indications about the use of crowdfunding for technological innovation projects.

Acknowledgements: This research was supported by Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES)/Fundação Araucária.

REFERENCES

Agrawal, A., Catalini, C., Goldfarb, A. 2014. Some simple economics of crowdfunding. *Innovation Policy and the Economy*, v. 14, pp. 63-97.

Ahlers, G. K. C., Cumming, D., Guenther, C., Schweizer, D. 2015. Signaling in equity crowdfunding. *Entrepreneurship Theory and Practice*, 394, pp. 955-980.

Barbosa Filho, F. H. 2017. A crise econômica de 2014/2017. *Estudos Avançados*, 3189, pp. 51-60.

Bardin, L. 2006. *Análise de conteúdo*. Lisboa: Edições 70 Press.

Belleflamme, P., Omrani, N., Peitz, M. 2015. The economics of crowdfunding platforms. *Information Economics and Policy*, v. 33, pp. 11-28.

Brazil. 2005. *Law No. 11.196*, avalilable online at: http://www.planalto.gov.br/ccivil_03/_ato2004-2006/2005/lei/l11196.htm.

Bruton, G., Khavul, S., Siegel, D. S., Wright, M. 2015. New Financial alternatives in seeding entrepreneurship: microfinance, crowdfunding, and peer-to-peer innovations. *Entrepreneurship Theory and Practice*, 391, pp. 9-26.

Demirel, P., Parris, S. 2015. Access to finance for innovators in the UK's environmental sector. *Technology Analysis & Strategic Management*, 277, pp. 782-808.

Frydrych, D., Kinder, T. 2015. How new is crowdfunding? The venture capital evolution without revolution - Discourse on Risk Capital Themes and their Relevance to Poland. *Problemy Zarzadzania-Management Issues*, 134, pp. 177-194.

Gerber, E. M., Hui, J. 2013. Crowdfunding: Motivations and deterrents for participation. *ACM Transactions on Computer-Human Interaction*, 206.

Giudici, G., Guerini, M., Rossi-Lamastra, C. 2017. Reward-base crowdfunding of entrepreneurial projects: The effect of local altruism and localized social capital on proponents' success. *Small Bus Eco.*, 502, pp. 307-324.

Glaser, B. G., Strauss, A. L. 1967. *The discovery of grounded theory*. Chicago, Aldine Press

Gleasure, R., Feller, J. 2016. Emerging technologies and the democratisation of financial services: A metatriangulation of crowdfunding research. *Information and Organization*, 264, pp. 101-115.

IBGE. 2016. *Pintec 2014*, available online at: https://www.ibge.gov.br/estatisticas/multidominio/ciencia-tecnologia-e-inovacao/9141-pesquisa-de-inovacao.html?edicao=9142&t=downloads.

Justo, G. D. 2015. *Crowdfunding no Brasil*. Masters dissertation, Federal University of Pernambuco, Recife, Brazil.

Lehner, O. M., Grabmann, E., Ennsgraber, C. 2015. Entrepreneurial implications of crowdfunding as alternative funding source for innovations. *Venture Capital*, 171-2, pp. 171-189.

Lundvall, B-A. 2010. *National systems of innovation: toward a theory of innovation and interactive learning*. USA, Anthem Press.

Mollick, E. 2014. The dynamics of crowdfunding: An exploratory study. *Journal of Business Venturing*, 291, pp. 1-16.

Monteiro, M. C. P. 2014. *Crowdfunding no Brasil*: *Uma análise sobre as motivações de quem participa*. Masters dissertation, Getúlio Vargas Fundation, Rio de Janeiro, Brazil.

OECD 2018, *Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data*, available online at: https://www.oecd-ilibrary.org/docserver/9789264304604-en.pdf?expires=1619895906&id=id&accname=guest&checksum=44B2606E52EFF70476C23CB7C0DAA4B0.

Osgood, G. E., Suci G. J., Tannenbaum, P. H. 1957. *The measurement of meaning*. Urbana, Illinois: University of Illinois Press.

Prijadi, R., Wulandari, P., Desiana, P. M., Pinagara, F. A., Novita, H. 2020. Financing needs of microenterprises along their Evolution. *International Journal of Ethics and Systems*. 362, pp. 263-284.

Profatilov, D. A., Bykova, O. N., Olkhovskaya, M. O. 2015. Crowdfunding: Online charity or a modern tool for innovative projects implementation? *Asian Social Science*, 113, pp. 146-151.

Riffel, M. G. 2016. *Crowdfunding: de modismo a novo instrumento financeiro*. Masters dissertation, Getúlio Vargas Fundation, Rio de Janeiro, Brazil.

Roggan, J. 2015. *Motivation of German entrepreneurs to seek equity via crowdfunding: An exploratory study*. Masters dissertation, Getúlio Vargas Fundation, Rio de Janeiro, Brazil.

Salomon, V. 2016. Emergent models of financial intermediation for innovative companies: From venture capital to crowdinvesting platforms in Switzerland. *Venture Capital*, 181, pp. 21-41.

Tidd, J., Bessant, J., Pavitt, K. 2008. *Gestão da inovação*. Porto Alegre, Bookman Press.

World Bank. 2013. *Crowdfunding's potential for the developing world*. Washington, DC: World Bank, available online at: http://www.infodev.org/infodev-files/wb_crowdfundingreport-v12.pdf.

Xu, B., Zheng, H., Xu, Y., Wang, T. 2016. Configurational paths to sponsor satisfaction in crowdfunding. *Journal of Business Research*, 692, pp. 915-927.

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