Chapter 7
Financing Start-Up Projects in Circular Economy: Does Crowdfunding Fit?

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Abstract Financing a green and circular economy is a multi-level problem for entrepreneurs, businesses, local governments, and nations worldwide. Alternative methods of finance have become increasingly popular as a means of obtaining necessary funds due to the advancement of modern technology. Crowdfunding is one example of such a capital network. This chapter emphasizes the role of crowdfunding in financing start-ups oriented towards sustainable, green, or circular projects, exploring their likelihood of success. We hypothesized that start-up projects that use circular economy principles have a better chance of raising the desired amount of money from the crowd. We collected data for the study from the "Kaggle.com" open-source repository. Our findings show that campaigns oriented to the concept of circularity differ from others in several parameters. Campaigns with circularity elements target higher amounts of funds and raise more money. They are also more often chosen as a staff pick. Along with this, the results of econometric estimates support the conclusion that campaigns with circular orientation are more likely to be successful.

Keywords Circular economy · Crowdfunding · Start-ups · Kickstarter campaigns

7.1 Introduction

Economic activity and a society based on consumption have led to the emergence of a large amount of waste, which is no longer merely an environmental issue. In that aspect, many researchers criticized growth models employed thus far from social and environmental perspectives, requiring the repair of the current socio-economic paradigm. One of the approaches that is often viewed as a solution to this issue is circularity. A circular economy (CE) enables economic prosperity by creating new sectors and jobs.

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V. Obradović (ed.), *Sustainable Business Change*,
https://doi.org/10.1007/978-3-031-23543-6_7

The transition to CE necessitates the reuse of materials or product designs and the implementation of new economic models. A circular business model (CBM) explains how an organization creates, delivers, and captures value with and within closed material loops (Mentink, 2014). Start-ups can become circular pioneers using this principle. Their environmentally friendly products or services provide a positive environmental impact, contribute to a greener economy (Bergset & Fitcher, 2015), and on the other hand, are extremely interesting for consumers.

Financing in a green and circular economy is a challenge on multi-levels for entrepreneurs, companies, local self-government, and states worldwide. The typical perception of investing in environmental activities is that it reduces profitability and that environmental investments have a negative impact on the stock market (Hamilton, 1995; Halme & Niskanan, 2001). These facts are unsustainable in the twenty-first century (Ljumović & Pavlović, 2016; Lukić et al., 2018). Companies that implement environmental principles can reduce costs and increase earnings because they have: better access to specific markets, easier product differentiation, sell pollution control technology, better relationships with stakeholders, lower costs of inputs (Porter, 1991; Porter & van der Linde, 1995), and various national and international support programs (Ambec & Paul, 2008). Although CE creates a new economic paradigm, access to finance and limited financial opportunities are significant barriers for start-ups to realize new business ideas and take growth opportunities.

We organized the remainder of the chapter as follows. In Sect. 7.2, we provide a literature review and explore the phenomena of the circular economy, circular start-up, and the role of crowdfunding. Furthermore, we elaborate on the research hypotheses. Section 7.3 presents data, methodology, and descriptive statistics. Finally, we report our findings and summarize the results.

7.2 Literature Review

7.2.1 Circular Economy

Research with CE elements has developed intensely over the last few decades. For instance, in the 1960s, Boulding (1966) used the idea of closed systems in terms that the outputs of all parts of the system are linked to the inputs of other components. In the 1970s, Stahel and Reday-Mulvey (1976) pointed out the possibility of the life extensions of products concerning the ecological aspect of the process. Their focus was on the dematerialization of the industrial economy by observing it as a loop to prevent waste, create jobs, and resource efficiency. Stahel (1982) proposed a spiral-loop system based on reuse (loop 1), repair (loop 2), reconditioning (loop 3), and recycling (loop 4), emphasizing the role of the private sector in this new self-replenishing economy. Equally, Pearce and Turner (1990) investigated the linear and open-ended characteristics of modern economic systems, while Geissdoerfer

et al. (2017) referred to Boulding's (1966) work in terms that natural resources can provide inputs for production and consumption. Although it happened for a relatively long period, various research contributed to creating the circular economy concept, or simply the circularity.

Even now, a circular economy is not an easy term to define. It gained attention among scholars and practitioners worldwide, which has led to the emergence of many definitions and understandings of the concept (Kirchherr et al., 2017; Merli et al., 2018). Kirchherr et al. (2017) identified 114 definitions of CE, classified into 17 dimensions, pointing out that CE is a combination of reducing, reusing, and recycling activities. This can be summarized in the definition by the European Commission (2015) that highlights the importance of extended use of products, materials, and resources with minimum of waste. CE is an economy trying to redefine growth by overcoming the take-make-dispose linear pattern (Merli et al., 2018) on micro, mezzo, and macro levels (Bauwens et al., 2020). According to Blomsma and Brennan (2017), CE's main principles are reuse, recycling, and remanufacturing. However, the list of R's spreads out the literature, and we found several R's as a basis for a circular business model. For instance, Brennan et al. (2015) or Kirchherr et al. (2017) classify it as Regenerate, Reduce, Reuse, Recycle, and Recover.

Although several terms can be associated with the CE, in their literature review, Beaulieu et al. (2016) note that the following concepts provided the frame for circularity: (a) sustainable development, (b) ecological transition, (c) green economy, (d) functional economy, (e) life cycle thinking, (f) cradle to cradle thinking, (g) shared value, (h) industrial ecology, (i) extended producer responsibility, and (j) ecodesign. If we observe these elements together, CE is a sustainable economic system based on R's with value creation throughout the supply chain, which requires fundamental changes in legislation, innovations, and socio-economic model (Schenkel et al., 2015; Reichel et al., 2016; Corona et al., 2019).

World Economic Forum (Global Risk Report, 2020) presented the circular economy as a win-win option instead of a trade-off that is currently in use, especially in terms of GHG emissions and habitat loss. Besides the ecological aspect, one of the main questions of the circular economy is how to make a profit while reducing dependence on natural resources and how circularity can be a driver for business competitiveness (Bocken et al., 2016). In a study done by McKinsey (2016), the analysis showed that six circular-economy activities could improve performance and reduce costs: Regenerate (shift to renewable energy); Share (prolonging product life); Optimize (better product efficiency); Loop (remanufacturing and recycling); Deliver and use (utilize virtually); Exchange (the use of new technologies).

It is necessary to involve all stakeholders to implement these six elements because innovation circulates in the circular economy. According to Millette et al. (2020), stakeholders interact to provide needed information for the circular economy's implementation and development. This approach is a circularly focused incubator where stakeholders include entrepreneurs, companies on both sides of seeking and making it an added value, government, academia, and NGOs. In that aspect, how can a circular economy boost circular projects, especially start-ups?

7.2.2 Circular Economy and Start-Ups

For a company to be the pioneer of circularity, it is not enough to change current materials or product design. Implementing new business models or so-called circular business models (CBM) is vital. According to Geissdoerfer et al. (2020), this term was first introduced by Schwager and Moser (2006). Geissdoerfer et al. (2018), observes CBM as a sustainable business model with the aim to create additional monetary and nonmonetary value in a long-term perspective. At the same time, Osterwalder and Pigneur (2010) highlight the rationality in creating, delivering, and capturing values within the closed material loop.

Urbinati et al. (2017) note that circular business models can be focused on improving the circularity of the value creation systems downstream or combining both. Also, different CBM can be used at various stages of circularity transition. This can include innovating the current business model. At the same time, start-ups can adopt a circular business model from the start, based on the principle design to last (Henry et al., 2019). In that aspect, circular start-ups overlap with other different environmental models. Regarding the approach to new markets, start-ups can use different circular business models such as sustaining innovations, low-end disruptions, new-market disruptions (Vuorio, 2020), or their combination.

On the example of 147 circular start-ups in the Netherlands, Bauwens et al. (2019) found that circular start-ups develop higher circularity strategies regarding waste management and are more open to innovations. Henry et al. (2019) did similar research on a sample of 128 circular start-ups in the Randstad region in the Netherlands, Berlin, and London. The authors concluded that there are five circular start-up archetypes: design-based (circular innovations are adopted in the pre-market phase); waste-based (exploring external waste streams); platform-based (use of share/trade business model in B2B, B2C, or C2C); service-based (increase efficiency in service-systems) and nature-based start-ups (use the nature-based systemic solution in products and services).

But even if there is a defined circular start-up archetype and CBM, one of the principal issues is how limited resources influence the start-ups and what type of financing can they use.

7.2.3 Circular Economy and Crowdfunding

Access to finance for companies is a central issue for enterprises worldwide that can strongly influence the success or failure of a start-up (Carter & Van Auken, 1990; Gimeno et al., 1997; Ljumović et al., 2015a, b; Ljumović & Jakšić, 2015; Kee et al., 2019; Irwin et al., 2019). Challenges in access to finance can arise due to a wide specter of reasons, but at the same time, it is an essential condition for the innovation ecosystem (Wyman, 2017). Obstacles can arise due to the lack of collateral or profit (Cosh et al., 2009, Ljumović et al., 2015a), low reputation and small size

(Cassar, 2004), lack of valid documentation – balance sheet figures, or proof of success (Bernstein et al., 2017; Jones & Jayawarna, 2010), information asymmetries and moral hazard problems between start-ups and investors (Lee et al., 2015; Nofsinger & Wang, 2011). While start-ups find it difficult to gain a foothold in using financial services, companies with already established credit histories are offered ease of access due to their prior inclusion into the financial market. The valuation of start-ups can be challenging because of their characteristic (Ljumović et al., 2012). Ortas et al. (2013) note that ecological investments vary across countries and regions in terms of the level of development of the financial system. This includes capital availability, degree of development of the banking sector, the existence of financial regulators, and technology risks. In practice, start-ups are pragmatic and use a range of financial instruments, not all targeting new companies (Bergset, 2015, 2018). Traditional sources of finance include all internal sources (founders' funds and returns from business activities, such as retained earnings, sale of inventories, fixed assets or other assets, and debt collection), financing from family and friends, banks, microfinance institutions, leasing company, and capital market.

With the development of modern technologies, alternative sources of financing are an increasingly popular source of financing the company's operations, and among them are social capital networks – crowdfunding. The scope of alternative products ranges from financing based on future income, online loans, peer-to-peer loans, cryptocurrencies (Bitcoin, Ethereum, XRP, Tether, and others), social bonds, and similar mechanisms beyond formal financial systems. Although it is a matter of raising relatively small amounts of money, in this way, it is possible to acquire significant amounts of funds (Ljumović & Pejović, 2020). Recently, crowdfunding has become increasingly relevant as a source of funding for start-ups (Bocken, 2015; Angerer et al., 2017; Cumming & Hornuf, 2018; Bergset, 2018; Brown et al., 2019).

According to Mollick (2014), crowdfunding represents efforts made by entrepreneurs to fund their venture ideas based on small contributions made by a large number or group of individuals only by using the internet, excluding traditional financial intermediaries. In other words, financial resources are raised directly from a large audience or the crowd (Belleflamme et al., 2014), based on stranger's willingness to support other strangers (Testa et al., 2019), which is a much more democratic way to access the capital (Mollick & Robb, 2016) and accelerate the innovation process.

Crowdfunding can take several forms: reward-based, donation-based, lending-based, and equity-based (Stanko & Henard, 2016; Vismara, 2019, Table 7.1). In their literature review, Böckel et al. (2020) discovered that donation-based crowdfunding was the most explored type of crowdfunding. However, this type constitutes only 8% of the global crowdfunding market (Massolution, 2015). According to Petruzzelli et al. (2019), every crowdfunding project needs a project creator, the backers, the crowdfunding platform, the campaign itself, and the crowdfunding outcomes. With these five elements, crowdfunding serves as a novel socio-technical practice (Testa et al., 2019) that has the potential to transform financial structures, overcome geographical barriers (Agrawal et al., 2015), be more flexible than traditional sources of financing, and become an effective marketing tool (Efrat & Gilboa, 2019).

Table 7.1 Forms of crowdfunding

Reward based	Proponents seek financial contributions from a crowd of backers in exchange for rewards or customized products or services. There are two types of reward-based crowdfunding: keep-it-all (KIA) and all-or-nothing (AON)
Donation based	Charitable giving with no material delivery to donors
Lending based	Peer-to-peer lending – Fixed interest rates for landers
Equity based	Entrepreneurs make an open call to sell a specific amount of equity in their company

Source: Forbes and Schaefer (2017); Wang et al. (2018); Vismara (2019)

Because it is gaining more attention, researchers analyze different aspects and the factors that influence the role and success of crowdfunding. For instance, Ordanini et al. (2011) examined how the crowd's behavior affects crowdfunding, while Zhou et al. (2016) focused on project description: length, readability, tone, experience, and past expertise. On the other hand, Gerber et al. (2012) identified that financing, forming relationships and networks, self-affirmation, replication of success stories, and increased awareness of the product influence the decision to use crowdfunding.

Stanko and Henard (2017) emphasize that backers generate word-of-mouth awareness. Their research concluded that the amount of funding raised during a crowdfunding campaign does not significantly impact the later market performance of the crowdfunded product. At the same time, the number of backers attracted to the campaign does. In similar research done on a sample of 959 projects in China, Wang et al. (2018) note that comment quantity, comment score, reply length, and reply speed by backers are positively associated with fundraising success.

At the same time, Block et al. (2018) emphasize the importance of crowdfunding as a tool to foster sustainability. In that aspect, we will focus more on this relationship because the connection between crowdfunding projects and environmental issues is increasingly analyzed, and authors are putting this phenomenon at the center of their research. In this context, Thompson et al. (2011) state that no distinction should be made between environmental and sustainable entrepreneurship but observed as a link between entrepreneurship and sustainable development. According to Böckel et al. (2020), the first article addressing the relationship between sustainability and crowdfunding was published in 2011. Jovanovic (2019) analyzed 90 scientific papers published between 2011 and 2016 and found that 8% of all research on crowdfunding relates to sustainability. This can be explained by the high expectations that crowdfunding will help to accelerate sustainability (Böckel et al., 2020).

In that sense, Bocken et al. (2014) identify crowdfunding as an example of a business model that can help develop and scale-up sustainable innovations by bringing together like-minded individuals, firms, and investors. In doing so, Petruzzelli et al. (2019) identified five aspects to comprehend the sustainability implications of crowdfunding properly. For instance, in the case of creators, they need to set up

effective communication with potential backers because these types of projects often provide a public good, and if the crowd is focused on social issues and doing social good, then crowdfunding is an ideal tool to fund sustainable entrepreneurs or green start-ups (Calic & Mosakowski, 2016). Authors note that crowdfunding can support social entrepreneurship that emphasizes sustainability. They found that projects with social or sustainable components will be more successful than commercial-only projects, which is closely related to their conclusion that sustainability impacts creativity, which increases the success of crowdfunding. Confirmation can be found in Böckel et al. (2020), concluding that 74% of analyzed articles have a social component in the sustainability dimension of crowdfunding.

The communication process (Petruzzelli et al., 2019), public discourse about crowdfunding and sustainability, social media (Mollick, 2014), and other factors can all be important, mainly because they can reach geographically dispersed people (Saxton & Wang, 2013) and play a vital role in the success of crowdfunding campaigns (Lu et al., 2014; Beier & Wagner, 2015). In that aspect, it is essential to assess the interpolation between crowdfunding and sustainability in social media. Using Social Media Analytics (SMA) to track public discussions regarding crowdfunding showed that social media debate on sustainability and sustainability-oriented campaigns receives limited attention (Laurell et al., 2019). In other words, social and sustainable entrepreneurs should focus on specific user segments. Dos-Santos et al. (2020) did similar research and used the same approach as Laurell et al. (2019) but included the Google Trend in the analysis. Their results show that crowdfunding has been increasing since 2014, and its sustainable dimension is considered a proxy of marketing strategy.

Because crowdfunding encourages innovation, it can help close the funding gap for sensitive projects whose primary goal is to benefit the public good. One such example is cleantech because a cleantech crowdfunding campaign delivers more than just a product and accelerates the transition to a low-carbon economy (Bento et al., 2019). But the issue of new technologies, especially cleantech, is differently treated by countries. For instance, Cumming et al. (2017) analyzed 20,000 different cleantech projects on the Indiegogo platform in 81 countries worldwide. Results show that cleantech crowdfunding is more common in countries with low levels of individualism and is more common when oil prices are rising. This is consistent with Adhami et al. (2017).

On the other hand, Bento et al. (2019) discovered that after the country's risk is considered, the returns are not consistent with the risks associated with the technology employed in the projects, based on a sample of 365 European cleantech projects. Regarding the effect that institutional settings in a country can have on green crowdfunding campaigns, Butticè et al. (2019) notice that green campaigns are more diffused in countries with a limited environmental sustainability orientation. They based their sample on the population of 48,598 campaigns launched on Kickstarter between July 1, 2009, and July 1, 2012. Adhami et al. (2017) analyzed the determinants of the funding success of a sample of 423 green projects published in 27 specialized crowdfunding platforms in Europe from 2011 to 2017 using two different indexes: the Environmental Performance Index and the Social Sustainability

Index. The result shows a significant positive effect of green crowdfunding activity on these two indexes. Finally, Ljumović et al., (2021a, b) found that sustainable campaigns in the agri-food industry are more successful in countries with relatively lower importance of agriculture in the country's economy.

We expect significant differences between the project campaign oriented to the circular economy concept and others following the analyzed literature. Thus, we derive our first hypothesis:

H1. There is a statistically significant difference between the campaigns of the projects oriented to the circular economy and others.

Crowdfunders are often driven by normative or altruistic motives (Lindenberg & Steg, 2007), usually focus on the entrepreneurs' core values and ideas (such as sustainability, social agenda, and similar) instead of focusing on business plans (Lehner, 2013), and are initiated by intrinsic motives (Allison et al., 2015). Although the number of papers on this topic is growing, there is still no conclusive evidence about whether the environmental orientation of crowdfunding projects can influence their likelihood of successful funding. Several types of research tried to find the relationship between sustainability orientation and crowdfunding success, and while Lehner (2013); Belleflamme et al. (2014); Calic and Mosakowski (2016) note that the social aspect of crowdfunding is the reason to have a positive likelihood of success of crowdfunding campaigns, opposite to this, Hörisch (2015) found no positive effect of environmental orientation in terms of its likelihood of success. Their results show that sustainability-oriented projects do not present a significant advantage in terms of crowdfunding success. This is consistent with Moss et al. (2015) that crowdinvestors often focus on profit-seeking opportunities.

Motylska-Kuzma (2018) found similar results in the case of Polish crowdfunding sites, where the project's long-term sustainability was less significant. There are also studies with mixed results, such as Cumming et al. (2017) in the case of cleantech projects. According to the authors, on average, these projects are not significantly more successful, but at the same time, they attract significantly higher total pledges and more backers. Vismara (2019) made the same conclusion on a sample of 345 crowdfunding projects in the UK. In other words, although projects with a sustainability orientation don't have better chances of success, they attract a higher number of restricted investors. Butticè et al. (2019) notice that in countries with higher Environmental Performance Index, sustainability or green crowdfunding campaigns do not positively impact the likelihood of success.

Following this, we have set our second hypothesis:

H2. Projects oriented to the circular economy are more likely to succeed at crowdfunding than projects without the orientation to the circular economy, ceteris paribus.

7.3 Methods

Kickstarter is one of the oldest and largest crowdfunding platforms, and it has been used in several studies (e.g., Pitschner & Pitschner-Finn, 2014; Mollick, 2014; Colombo et al., 2015; Butticè et al., 2017; Courtney et al., 2017; Butticè et al., 2019; Böckel et al., 2020). According to the Kickstarter website (https://www.kickstarter.com/about?ref=global-footer), its mission is to help bring creative projects to life and make ideas into reality. Creators share new visions for creative work with the communities that will come together to fund them. Kickstarter is a reward-based crowdfunding platform with an "all-or-nothing" funding model, meaning that if a campaign fails, the project creators do not get funding, nor do the bakers get a reward. Creators can cash in the money pledged only if the campaign reaches the funding goal. However, there is no upper limit to the amount of money creators can attract during the campaign. Rewards are products, services, or gadgets, while financial rewards, equity shares, and interest for a loan are now allowed. For a small contribution, creators can offer a symbolic gift, such as thank you note or a small reward (promo material and similar).

In contrast, rewards can include the pre-purchase of the product for a full contribution. The platform hosts 15 categories: art, comics, crafts, dance, design, fashion, film, food, games, journalism, music, photo, publishing, technology, and theatre. Statistics on crowdfunding change daily, and currently, there is no official, unified statistics. As of December 2020, the success rate of fully funding a project on the Kickstarted was 38.28%, with 507,318 launched projects and 4.93 billion U.S. dollars pledged. Identifying what leads to the success of a crowdfunding campaign can be very helpful for project creators (Greenberg et al., 2013; Xu et al., 2014) because, according to Zhou et al. (2016), literature shows that less than 50% of projects were successfully funded on Kickstarter.

7.3.1 Sample

We collected data for the study from the "Kaggle.com" open-source repository. The initial full dataset provided on the repository contained data on 430,938 Kickstarter campaigns from 2009 to 2019. The dataset provided detailed information on crowdfunding campaigns, including attributes such as the title of the project (campaign); project goal; funding goal as the amount of money a creator needs to complete the project; blurb; short description displayed under the name of the project and on the browse part of the platform page; pledged funds, as the amount of money the project raised; backers, as the number of people that have supported the project; state of the project as successful, failed, canceled, live or suspended; country of origin of the campaign creator; currency; category, and similar.

On the Kickstarter platform, projects can have five statuses: active, successfully funded, failed, canceled, and suspended. In the case of active projects, fundraising

is ongoing. When projects achieve funding goals, they are defined as successfully funded. On the contrary, they are marked as failed projects if they do not meet the funding goal. Canceled projects are void by the creator before the end of the duration. Kickstarter bans suspended projects for reasons such as violating the rules, misrepresentation, or others (Liang et al., 2020). Following Pitschner and Pitschner-Finn (2014), a project is coded as "successful" if the target amount defined by the initiators is reached and as "unsuccessful" if the project fails to fund the targeted amount.

Kickstarter is an international platform where entrepreneurs may post amounts in different currencies. All currencies other than USD were converted into USD using a yearly average exchange rate.

Before the analysis, we modified the dataset. First, we excluded double entries and data for the project that were live (ongoing) at the time of data collecting since we could not know their outcome (whether they succeeded or failed). In line with Liang et al., 2020, we removed all suspended projects and canceled where pledged value did not reach the target. We dropped off all campaigns with a goal below USD 5000 since they often target friends and family members (Cumming et al., 2017; Mollick, 2014; Liang et al., 2020). A final filter was to remove extreme values, so-called outliers, or those beyond the 99-percentile distribution in our case with a value of over $500,000 (Butticè et al., 2019). This leads to a final dataset of 130,528 project campaigns as presented in Table 7.2.

7.3.2 Variables

We founded hypotheses on the idea that a start-up project incorporating circular economy principles has a higher chance of launching a crowdfunding campaign. In line with this and the literature analyzed, our primary concern was to identify campaigns in the sample that have the element of the circular economy. To test our hypotheses, first, we had to identify projects that integrate the circular economy principles. We further applied econometric estimates, where the dependent variable is a dummy, indicating whether a crowdfunding campaign integrates the principles of the circular economy. A variable is a dummy equal to one if we identified such elements and zero elsewise. In other words, if the campaign contained

Table 7.2 Process of the database modification

All projects	430,938
Double entries, ongoing, canceled, and suspended projects	133,801
Projects with a goal of less than 5000 and over 600.000 dollars	166,609
Total sample projects	130,528

circular-economy activities, it was classified as a circular economy project, elsewise as a non-circular economy project.

We followed the work of Cumming et al. (2017) in testing the hypotheses and identifying projects that integrate the principles of the circular economy. For this purpose, we performed a text analysis technique by searching predefined keywords related to the circular economy concept. After a detailed literature review (presented in the previous part of this research), we have identified several words. Then, we have been searching for them in the project description: "circular economy", "reuse", "renewable", "recycle", "renewable", "remanufacture", "regenerate", "fuel consumption", "waste", "cleantech", "Greentech", "GHG", "low-carbon", "environmental", "sustainable", "ecology", "eco-", "solar", "biomass", "hydro", and "wind". This way, we got the 2871 campaigns identified as circular. Here are some examples of the campaigns included in the sample as circular-oriented. *Food waste to energy converter – re-invent the food cycle.* A new way to convert food waste within your community into fertilizer & renewable fuel. Portable and affordable machine that converts food scraps into energy and plant food using microbes with zero waste. *Bluecup – Refillable capsule for Nespresso.* A reusable and refillable capsule for use in Nespresso® machines. The system provides a choice of espresso capsule for the customer and is 99 times more environmentally friendly than prefilled capsules and cost-efficient (data for projects: Kickstarter.com website).

We expect, for all variables, except for target capital (where we expect negative correlation), to be positively correlated with the campaign's success.

7.3.3 Descriptive Statistic

Overall, among the crowdfunding 430,938 campaigns posted on Kickstarter during the considered time window, after the modification, we have received 130,528 campaigns. We classified 2871 as circular projects economy (2.2%). In Table 7.3, we have reported the descriptive statistic of the related sample used in this study. The number of successful projects is in line with the general statistic on the Kickstarter platform. It amounts to a bit above 40% (41% for the whole sample and 43.3% for the campaigns related to the circular economy). Comparing the two groups, the success rate is slightly higher at 3.3% for campaigns related to the circular economy concept.

Two categories stand out in absolute and relative terms, namely technology and food. These two are the project categories, including most crowdfunding campaigns related to the circular economy (in absolute 591 and 540 respectively, or 20.6% and 18.8% in relative terms). Fashion and design are the following categories with 438 and 376 campaigns or 15.3% and 13.1% share (the results are consistent with Butticè et al., 2019). All other categories contain a limited number of campaigns related to circular economy projects that are below 10%, or 160 campaigns. It is not surprising that there is a relatively small number of campaigns in other categories, considering the nature of projects related to the concept of circularity. The majority

Table 7.3 Descriptive statistic

Characteristic	Sample	Oriented towards the circular economy
No. of projects	130,528	2871
Successful projects (%)	41.0%	43.3%
Average no of investors mean (median)	206.61 (27.00)	211.35 (38.00)
Average funding target (in 000) mean (median)	26.77 (11.30)	31.79 (15.00)
The average amount of pledged (in 000) mean (median)	18.95 (2.37)	20.82 (4.82)
Duration of the campaign	35,11 (35.00)	35.05 (30.00)
Staff pick	19,550 (15.0%)	513 (17.9%)
Spotlight	53,579 (41%)	1244 (43.3%)
Year	*% of campaigns*	*% of campaigns*
2009	0.2	0.1
2010	1.9	2.0
2011	4.9	3.9
2012	9.5	7.2
2013	10.6	8.5
2014	17.0	17.1
2015	20.8	20.0
2016	13.6	13.2
2017	11.1	13.4
2018	9.0	12.7
2019	1.4	1.8
Category	*% of campaigns*	*% of campaigns*
Art	5.6	5.5
Comics	2.3	0.6
Crafts	1.4	3.3
Dance	0.9	0.5
Design	5.4	13.1
Fashion	6.7	15.3
Film & video	15.8	6.5
Food	8.7	18.8
Games	10.2	5.4
Journalism	1.7	1.5
Music	11.8	1.6
Photography	2.2	1.0
Publishing	11.1	5.9
Technology	14.6	20.6
Theatre	1.8	0.5

of the campaigns in the sample were published in 2015, followed by 2014, 2016, and finally 2017 and beyond. The campaigns related to the circular economy are distributed similarly to the whole sample.

Several studies identified that particular types of campaigns could differ in different dimensions. Differences in "green" and "clean" campaigns exist along several dimensions, such as the number of backers, average, target goals, number of visuals, external links and networks, comments, and education (Butticè et al., 2019). Cumming et al. (2017) confirmed these findings for target goals. They expanded the list of the following features: funding model, digital output, teams, soft information, total pledge, and periods when there has been an increase in oil prices. However, they did find duration, comments, and social networks to be statistically insignificant features.

In our study, we found that campaigns with the element of circularity have greater success (0.433 opposite to 0.410, p-value <0.05), and target higher amounts of funds, namely $31,785.32 against $26,653.59 compared to non-circular campaigns (p-value <0.05). In addition, they are more often chosen as a staff pick (0.18, against 0.15, p-value <0.05) and more frequently use the spotlight function (0.43 vs 0.41, p-value <0.05). These elements favor our first hypothesis that projects related to the circular economy concept differ. On average, circular campaigns raise more money than non-circular campaigns ($20,814.47 vs. $18,906.32), but this difference was not statistically significant. There is no significant difference in the number of backers or duration (Table 7.4).

Table 7.4 Comparison between circular and non-circular campaigns

	Circular	*Non-circular*
Observation	2871	127,657
Success	0.433*	0.410*
	(0.496)	(0.492)
Backers	211.35	206.50
	(810.86)	(1181.39)
Goal	31,785.32*	26,653.59*
	(50,344.29)	(43,716.58)
Duration	35.05	35.11
	(11.48)	(11.97)
StaffPick	0.18*	0.15*
	(0.383)	(0.356)*
Spotlight	0.43*	0.41*
	(0.496)	(0.492)
Amount pledged	20,814.47	18,906.32
	(83,742.93)	(118,101.62)

* Significance level: 0.05

7.3.4 Results

In the second step of the analysis, we used the dummy variable on funding success to test the second hypothesis. We have run the following binary logistic regression model (as in Hörisch, 2015; Calic & Mosakowski, 2016; Cumming et al., 2017; Butticè et al., 2019; Vismara, 2019):

$$P\left(Y_i = 1\right) = \frac{1}{1 + e^{-(\alpha + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{6i} + \beta_7 X_{7i})}}$$

$X_{1=}$ No_Backers
$X_{2=}$ Circular_Economy
$X_{3=}$ Target_Capital
$X_{4=}$ Campaign_duration
$X_{5=}$ Staff_Pick

For the analysis, we used variables as described in Table 7.5. The dependent variable is the dummy differentiating projects that have reached the funding goal (success = 1) from those that did not (success = 0). This way, we estimated which factors, including the orientation to a circular economy, foster the likelihood of achieving the self-set targets.

The proposed model is significant ($p < 0.01$), and overall model fit information shows that the model explains the relevant share of the variation of the dependent variable (Cox & Snell R Square 0.552). Table 7.6 reports the results of our estimates. The effects of analyzed parameters on the funding success are statistically significant ($p < 0.01$). We found positive, statistically relevant relation between circularly oriented projects, the number of backers, and staff picks. Campaigns with the element of circularity are positively related to their likelihood of success (0.293). The odds of being successfully funded increase by 34% for circular projects compared to non-circular ones. Also, the number of backers is positively related to the

Table 7.5 Variable definition

Variable	Definition
Success	Dummy = 1 to one if the funding amount is higher than the target amount; 0 elsewise
No_backers	Numbers of backers that have invested in the campaign
Circular_economy	Dummy =1 if the identified activities are related to the concept of the circular economy, 0 elsewise
Target_capital	The logarithm of the target capital. For campaigns based on a currency other than USD, we converted the amount into USD at an annual average exchange rate
Campaign_ duration	Length of the campaign duration
Staff_pick	Indicating whether Kickstarter team members designated a campaign as a "favorite" while it was active

Table 7.6 Binary logistic results

Model summary	
Dependent variable	Funding Success
Pseudo R^2 (Cox & Snell R Square)	0.552
Significance of the model	0.000
Parametric rating	
CircBool	0.293*** (0.065)
Duration	−0.003*** (0.001)
Backers	0.033*** (0.000)
StaffPick	0.499*** (0.032)
LnGoal	−1.945*** (0.018)
Constant	15,529 (0,162)

Standard errors are in parentheses and *** Significance level: 0.01

campaign's success (0.033), with a 3.3% chance of greater success with each increase in the number of backers. If Kickstarter team members designated the campaign as "favourite" while it was active, the odds for success increased by 64.7%. We recorded a highly significant, negative regression coefficient for the ln of the funding target. This reveals, as expected, that projects with higher targets are less likely to be successful (−1.945). Surprisingly, we found a negative regression coefficient for the duration too. According to our results, the longer the campaign, the odds of success are lower (−0.003). Each increase in duration lowers the odds of success by 0.3%.

7.4 Discussion

Acquiring resources is critical for starting a business that influences all future ventures. Without external funding, companies and individuals have a limited capacity to develop new ideas and projects. Traditional financial institutions, such as banks, are generally unwilling to invest in new ventures. Without diverse sources of finance, good ideas can fail, where the growth potential for the economy is lost.

Crowdfunding was triggered by the development and increased number of social networks users, that are potential small investors. It can provide a critical link in start-up financing, filling the financial gap for start-ups. To address the question whether crowding platforms are suitable source of finance for a circular economy, we sought to understand the underlying factors that influence the decision to invest in projects related to the circular economy. The analysis results are somewhat mixed

but provide enough evidence to support our first hypothesis. Circular-oriented and non-circular-oriented campaigns on Kickstarter differ in several features. We can conclude that projects related to the circular economy concept, on average, have a higher chance for success, target and receive higher amounts of money, attract more backers, and are more frequently chosen as a favorite by the Kickstarter team members. However, we did not find pledged funds and numbers of backers to be statistically significant. Our results are consistent with Cumming et al. (2017) and partially with Butticè et al. (2019), except for the number of backers.

Concerning the success of campaigns with circularity, results of econometric estimates support the findings that circular-oriented projects are likely to belong to the group of successful projects. This is consistent with Belleflamme et al. (2014) and Calic and Mosakowski (2016), who found that projects with the elements of sustainability and social aspects have more success in funding. However, these results differ from Hörisch (2015), who found no positive effect of environmental orientation in terms of its likelihood of success, or Moss et al. (2015), claiming that crowd-investors are often focused on profit-seeking opportunities. Furthermore, results related to the duration of this research surprisingly point out the negative relationship between these two concepts. Although the variations are minimal, they are statistically significant, as in Mollick (2014), and are in line with Butticè et al. (2019), Cumming et al. (2017), but are not consistent with Hörisch (2015). Regarding the number of backers, we found week statistically significant association as in Vismara (2019). Nevertheless, because we only analyzed data from one reward-based platform, caution should be applied when interpreting our findings. Backers may be lenders (lending-based), owners (equity-based), philanthropists (donation-based) or consumers (reward-based). The type of the backer considerably impacts on the factors that determine a crowdfunding campaign's success. So far, no prior studies have taken into account nor addressed the connection between the influence of Kickstarter team members and success. Our results show a positive relationship between these two concepts, as we supposed when defining the variables in the model. This connection is relatively strong and increases the odds by 64.7%. Finally, in line with Mollick (2014), Hörisch (2015), Butticè et al. (2019), we found a negative connection between the goal of the campaign and success, referring to the fact that projects with higher funding targets are less likely to reach their funding targets.

7.5 Conclusion

This chapter provided an empirical analysis of the crowdfunding campaigns related to the circular economy that contributed to the academic literature. We examined over 130,000 campaigns from the Kickstarter platform around the world, where 2.2% were projects related to the concept of the circular economy to understand what factors correlate with the success of crowdfunding campaigns, taking into

account the idea of circularity. We chose to look at the whole picture without considering specific categories, as some authors prefer.

Overall, our results suggest that we can consider crowdfunding as a possible way to finance projects related to the concept of circularity. However, several limitations exist. In discussing the results, we interpret them as associations and not as causal relationships, so the odds for every specific variable depend on the simultaneous inclusion of other variables in the model. Next, we restricted the dataset to rewards crowdfunding campaigns collected from a single platform, so the results cannot be replicated on other crowdfunding platforms or different crowding types. Likewise, most project campaigns are US-based 75.8 percent, opposite to only 68 percent of circular campaigns based in the US. In interpreting results, we must consider this, considering that different economic, cultural, and political surroundings can affect crowdfunding success. Finally, our research includes only a limiting number of general success factors, whereas crowdfunding success depends on many more. To plan a successful crowdfunding campaign, you'll need to come up with a promotional concept, create promotional materials, and identify appropriate media channels for campaign promotion.

Acknowledgment This paper is a result of the research financed by the Ministry of Education, Science, and Technological Development of the Republic of Serbia.

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