Contributions to Finance and Accounting

Regina Lenart-Gansiniec
Jin Chen *Editors*

Crowdfunding in the Public Sector

Theory and Best Practices

Springer

Contributions to Finance and Accounting

The book series 'Contributions to Finance and Accounting' features the latest research from research areas like financial management, investment, capital markets, financial institutions, FinTech and financial innovation, accounting methods and standards, reporting, and corporate governance, among others. Books published in this series are primarily monographs and edited volumes that present new research results, both theoretical and empirical, on a clearly defined topic. All books are published in print and digital formats and disseminated globally.

More information about this series at http://www.springer.com/series/16616

Regina Lenart-Gansiniec • Jin Chen
Editors

Crowdfunding in the Public Sector

Theory and Best Practices

Springer

Editors
Regina Lenart-Gansiniec
Jagiellonian University in Kraków
Kraków, Poland

Jin Chen
Tsinghua University
Beijing, China

ISSN 2730-6038 ISSN 2730-6046 (electronic)
Contributions to Finance and Accounting
ISBN 978-3-030-77840-8 ISBN 978-3-030-77841-5 (eBook)
https://doi.org/10.1007/978-3-030-77841-5

This Springer imprint is published by the registered company Springer Nature Switzerland AG.
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

In recent years, crowdfunding has become important and it has been enthusiastically used not only by commercial organizations but also by the public sector. In the public sector context, crowdfunding is the funding of projects which, directly or indirectly, benefit from government funds, assets, or sponsorship, and may include the development of public assets. It is expected that crowdfunding as an example of process innovation and innovation in public sector management will help in solving social problems and to carry forward politically contentious services. This alternative source of financing in times of constrained government budgets enables citizens to vote with their dollars online to bring ideas into reality. However, despite the growing participation of public organization in the crowdfunding industry, little is known. The lack of scholarly attention to crowdfunding in public sector is an important omission in the literature, given that many public organizations around the world are already actively utilizing it.

The book "*Crowdfunding in Public Sector: Theory and Best Practices*" is a first comprehensive book on the crowdfunding in public sector I theory and practice. This book sheds more light on the developing concept of crowdfunding in public sector, with an overview of current academic discussions and best practices on crowdfunding in public sector. This book approaches crowdfunding in public sector from an integrated perspective, addressing the dearth of publications on the subject. This book explores the relationship between crowdfunding and collaborative governance. It also describes a typology of crowdfunding in public sector which will be useful to others in categorizing their crowdfunding approaches. It documents and disseminates the veritable treasure trove of practical experience currently available on crowdfunding in public sector. It offers a unique overview of what public organizations around the world are doing to implement crowdfunding and how their efforts relate to carry forward politically contentious services. The book gathers a wealth of theoretical information, ideas, best practices, and lessons learned in the context of executing concrete crowdfunding projects, and assesses methodological approaches to integrating the topic of crowdfunding in public organizations curricula.

This book provides a global definitions, insights, and examples of this managerial perspective resulting in a theoretical framework of crowdfunding in public sector. This book also explores different crowdfunding applications in public sectors such as local government, higher education, schools, arts and culture organizations, healthcare, energy sector, and police services. Including contributions from international academics, scholars, and professionals within the field, this book provides a global, multidimensional perspective on crowdfunding. We hope that you will find them informative and that they will help you shape your own thinking on crowdfunding in public sector.

Kraków, Poland — Regina Lenart-Gansiniec
Beijing, China — Jin Chen

Introduction

Crowdfunding understood as an open search of ideas and money has proven to be an important and enduring concept. In the past decades, the crowdfunding platforms such as KickStarter, IndieGoGo, or Causes have been significantly increasing their popularity. Scholars have been predominantly studying crowdfunding in the context of new ventures, but exploring it in the public sector is a missing piece that will help us in understanding the big picture of citizens' engagement in innovation, science, and governance.

I have researched the idea of Open Innovation for over a decade. As much as Open Innovation (Chesbrough 2003, 2020) highlighting the importance of purposeful knowledge inflows and outflows is almost 20 years old, the Open Innovation in Science (Susanne Beck et al. 2020) and Open Governance (Almirall et al. 2014) are still emerging phenomena. Open Innovation in Science encompasses purposeful knowledge inflows and outflows within and across organizations and disciplines along the entire research process. Open Governance also called Civic Open Innovation concerns the knowledge inflows and outflows within and across the governing boundaries of cities, municipalities (or counties), and regions where the wider public—citizens (and often residents) get a chance to actively shape and reshape the growth directions. As a result, services and decisions become more open, transparent, and inclusive.

Historically "lay" citizens were only the recipients of science education and legislations made by the educational institutions and governing bodies, respectively. The emergence of more democratized models was stimulated by the development of search-expanding technologies. These allowed wider dissemination of innovative ideas, popularization of exchange platforms, and (voluntary) participation in both sourcing and funding activities (Dahlander et al. 2021). Although there may be a different level of engagement, both crowdsourcing and crowdfunding may be considered as very promising approaches to boosting citizens' engagement in innovation, science, and governance.

Besides technological developments, we have been also witnessing a strong political back up in embracing openness. In 2009, on his first day in office, President

Obama signed the Memorandum on Transparency and Open Government, which was followed by multiple Open Innovation initiatives such as contests, hackathons, and campaigns. This Open Government initiative followed three principles for the government to be transparent, participatory, and collaborative. The main aim of this Memorandum was to empower the public to influence important decisions that affect their lives. This gave them a possibility to track how the government spends the money. The open data catalogue created in the USA was an inspiration to many European cities and governments. As a consequence, European Parliament adopted the Public Sector Information Directive in 2013 and Open Data Directive in 2017. Built on the extensive consultations, these directives cover the reuse of publically funded public sector information. With the changing mindset of citizens and supporting legislations, the last but not least element is the exchange platform.

Crowdfunding falls into one of the digital ways of accessing external knowledge (Bogers et al. 2017), which typically happens through a dedicated platform. The platform links people who network and pool their money—the bakers with other people or organizations—the proponents. The backers emerging from the crows of the Internet users offer financial support for the proponents of project ideas. The proponents not only get a chance to collect the necessary funding for implementing their projects but also get exposure to feedback and early market entry screening data. Scholars tend to focus on their crowdfunding studies on entrepreneurial ideas (Belleflamme et al. 2014; Colombo et al. 2015; Mollick 2014), which largely cover the commercial side of crowdfunding where the bakers expect some return of their investment. Crowdfunding in the public sector leans more towards the philanthropic side of crowdfunding where the bakers want to contribute to a greater good.

Studying crowdfunding in the public sector puts our attention to the broader set of institutional and infrastructural open innovation arrangements. Crowdfunding enables, enhances, and empowers citizen's innovation. The funding aspect is very important for supporting various types of initiatives, but at the same time, it offers citizen's a way to influence the innovativeness, compliance, and integrity of the public sector. To some extent, it may also challenge its performance and quality by highlighting potential areas of attention and improvement.

Crowdfunding in the Public Sector—Theory and Best Practices offers an excellent reminder of the theoretical foundations of collaborative governance along with very powerful practical examples from higher education, healthcare, the energy sector, and beyond. The interest in citizen consultations and participatory financing practices extends well beyond the United States and European Union, to Canada, China, and the United Kingdom. Digitalization of crowdfunding practices allows wider reach and impact thus create new opportunities for innovation. The definitions, frameworks, and typologies followed by the selected 6 diverse country-sector cases can be found on the pages here that follow. It is exciting and convenient to have it gathered all together in one book, covering multiple contributions. As it will encourage scholars and citizens for further exploration of the topic of crowdfunding in the public sector and implementation of its best practices.

This new approach to Open Innovation will help cities, municipalities (or counties), and regions create more effective, useful, and participatory services

for their citizens and other involved stakeholders. As these participatory and collaborative governance practices have been slowly emerging, the challenge is to get them more widely spread by sharing both good and bad experiences of Open Governance. Further research and implementations inspired by *Crowdfunding in the Public Sector* will allow us to write new chapters on purposeful knowledge inflows and outflows within and across the governing boundaries where the citizens actively contribute to services and decisions, which in turn become more open, transparent, and inclusive.

Garwood Center, UC Berkeley & Business Development and Technology, Berkeley, CA, USA

Agnieszka Radziwon

Aarhus University, Aarhus, Denmark

References

Almirall E, Lee M, Majchrzak A (2014) Open innovation requires integrated competition-community ecosystems: lessons learned from civic open innovation. Bus Horiz 57:391–400

Belleflamme P, Lambert T, Schwienbacher A (2014) Crowdfunding: tapping the right crowd. J Bus Ventur 29:585–609. https://doi.org/10.1016/j.jbusvent.2013.07.003

Bogers M, et al (2017) The open innovation research landscape: established perspectives and emerging themes across different levels of analysis. Ind Innov 24:8–40

Chesbrough H (2003) Open innovation: the new imperative for creating and profiting from technology. Harvard Business School Press, Boston, MA

Chesbrough H (2020) Open innovation results: going beyond the hype and getting down to business. Oxford University Press, Oxford

Colombo MG, Franzoni C, Rossi-Lamastra C (2015) Internal social capital and the attraction of early contributions in crowdfunding. EntrepTheory Pract 39:75–100. https://doi.org/10.1111/etap.12118

Dahlander L, Gann DM, Wallin MW (2021) How open is innovation? A retrospective and ideas forward. Res Policy 50:104218

Mollick E (2014) The dynamics of crowdfunding: an exploratory study. J Bus Ventur 29:1–16. https://doi.org/10.1016/j.jbusvent.2013.06.005

Susanne B et al (2020) The open innovation in science research field: a collaborative conceptualisation approach. Ind Innov. https://doi.org/10.1080/13662716.2020.1792274

Contents

Chapter 1
Crowdfunding: Definitions, Foundations and Framework

Anton Miglo

Abstract Crowdfunding is a form of financing or fundraising where a large number of investors pool their small (typically) individual contributions to support a project offered by an entrepreneurial firm. It is sometimes credited to be one of the top 10 innovations of the twenty-first century. This chapter discusses the basics of crowdfunding. It starts with a description of new innovative terminology related to crowdfunding. Examples include such terms as project founders/originators, project supporters/backers, crowdfunding platform etc. It then focuses on the foundations and details of the main types of crowdfunding, which includes reward-based crowdfunding, equity-based crowdfunding, debt-based crowdfunding and donation-based crowdfunding. We then discuss some major theories of crowdfunding including asymmetric information-based and moral hazard-based theories. For each theory, its major implications are presented and compared with available evidence. Particular attention is paid to the basics of crowdfunding in the public sector. We discuss government participation in crowdfunding and its role in the context of previously discussed theories. The benefits of government participation in crowdfunding projects include increasing trust in projects, improving information and increasing transparency related to projects, and reducing project risk.

Keywords Crowdfunding · Reward-based crowdfunding · Equity-based crowdfunding · Debt-based crowdfunding · Donation-based crowdfunding · Crowdfunding platforms · Backers · Information asymmetry · Moral hazard · Crowdfunding in public sector

A. Miglo (✉)
University of Salford, Salford, Greater Manchester, UK
e-mail: a.miglo@salford.ac.uk

R. Lenart-Gansiniec, J. Chen (eds.), *Crowdfunding in the Public Sector*,
Contributions to Finance and Accounting,
https://doi.org/10.1007/978-3-030-77841-5_1

1.1 Introduction

Crowdfunding is a method of raising funds from a large number of investors usually performed online. It is sometimes credited as one of the top 10 inventions of the twenty-first century.[1] It offers a new way of financing compared to traditional methods e.g., bank loans and equity financing. The advantages of crowdfunding compared to traditional ways of financing include the ability to quickly reach a large number of potential investors; opportunities to directly exchange information with crowdfunding participants and receive market feedback ("crowd wisdom"); and a minimal level of bureaucracy required. The amount of funds raised with crowdfunding reached $ 940.9 million in 2020.[2] This value is expected to keep growing in the next few years by 5.8%. By 2025, the World Bank Report estimates that global investment through crowdfunding will have reached $ 93 billion.[3]

Crowdfunding research is quickly growing. Moritz and Block (2014), Kuppuswamy and Bayus (2015), Alegre and Moleskis (2016), Cumming and Johan (2017), Cumming and Hornuf (2018), Estrin et al. (2018), Mochkabadi and Volkmann (2020) and Cumming et al. (2020) provide good reviews of the literature. Imperfect information and moral hazard problems have emerged as important issues in crowdfunding. On the one hand, investors do not have complete information about firms conducting crowdfunding and their projects (see e.g. Ahlers et al. 2015; Hildebrand et al. 2016; Belleflamme et al. 2014; Miglo and Miglo 2019; Chakraborty and Swinney 2021; Vismara 2016). On the other hand, there exists some risk of potential funds expropriation/misuse, and a system with perfect monitoring and control of start-up entrepreneurial firms conducting crowdfunding campaigns is hard to implement (see e.g. Moores 2015; Cumming et al. 2016; Strausz 2017; Chemla and Tinn 2020; Schwienbacher 2018; Babich et al. 2021; Belavina et al. 2020). The degree of campaign failure is very high in crowdfunding. Many of these failures are related to the inability to provide sufficient information about project's qualities and, respectively, to problems with convincing and attracting potential funders to invest in the project. Many others failed because of their inability to develop the production of products/services using funds collected during the campaign or failure to deliver the product on time (see e.g., Jensen and Özkil 2018; Mollick 2014).

Imperfect information and moral hazard problems can explain a good amount of interest in crowdfunding in the public sector since the government can help deal with these issues. This is similar to other areas of economics and finance where government participation is driven by different market imperfections in order to improve the outcome and avoid market failure (see e.g., Akerlof 1970; Oates 1972; Stiglitz 1993). Furthermore, there are other potential benefits of government participation in crowdfunding because of network effects of crowdfunding, i.e., it can create value

[1] http://www2.technologyreview.com/tr10/?year=2012

[2] Statista. https://www.statista.com/outlook/335/100/crowdfunding/worldwide

[3] https://crowdfundcampus.com/blog/2017/01/crowdfunding-in-2017-three-key-trends/

for a community without necessarily creating a financial reward or profit for individual investors, at least in the short run. Often it creates both: some financial rewards for investors and non-financial rewards for the community (see e.g. Belleflamme et al. (2014)). So crowdfunding is considered a helpful tool for developing and delivering public goods (Hudik and Chovanculiak 2018; Wenzlaff 2020; Adamo et al. 2020). There are two types of crowdfunding frameworks related to crowdfunding in the public sector. Type 1 involves crowdfunding campaigns organized by non-profit ventures (see e.g., Belleflamme et al. (2013)). In many cases non-profit-organizations can improve the efficiency of crowdfunding compared to traditional businesses because of their focus on community benefits. Type 2 crowdfunding campaigns are organized by profit-based businesses where a significant role is played by the government (see e.g., Hong and Ryu (2018)). The benefits of government participation in crowdfunding projects include, among others, increasing trust in crowdfunded projects, improving information about projects and reducing project risk.

We structure this chapter as follows. The following section reviews description of new innovative terminology related to crowdfunding. Section 1.3 discusses discuss some major theories of crowdfunding including moral hazard and asymmetric information problems. Section 1.4 discusses issues related to crowdfunding in the public sector and Sect. 1.5 provides conclusions.

1.2 Basics of Crowdfunding

As some researchers argue, crowdfunding was used a long time ago. For example, it was used by (book) writers in the eighteenth to nineteenth century.[4] It was also used to collect funds for building the Statue of Liberty in New York, USA.[5] In a modern form, crowdfunding is "*an open call, essentially through the Internet, for the provision of financial resources either in form of donation or in exchange for some form of reward and/or voting rights in order to support initiatives for specific purposes*" Lambert and Schwienbacher (2010, p. 4). One of the key words here is the Internet. Indeed, because of the Internet crowdfunding has become a part of what is called FinTech, which is a new wave of technological innovation in finance penetrating many areas of the financial industry including traditional areas such as payments, investments and financing. It is, on the one hand, based on the latest technological developments and, secondly, its philosophy is often based on the concept of "no-middle–men" (such as, for example, traditional financial intermediaries as commercial banks) and so it can potentially become much a more efficient way of conducting financial transactions (Das 2019).

[4] See e.g., Simons (2016).

[5] BBC Online (2013).

Fig. 1.1 Structure of funds flows and informational flows in crowdfunding

Crowdfunding is considered by many entrepreneurial, innovative and small and medium-size firms as an attractive tool for raising funds compared with other financing sources such as bank loans, for example, that usually have more requirements and conditions. Banks would usually like to see some credit history, they like to deal with firms with significant amount of tangible assets that can be used as a collateral, and they like to see some stability in firm's cash flows, etc., which is in most cases hard/impossible for innovative and/or small-medium size businesses. This often leads to a credit rationing problem (Stiglitz and Weiss 1981). Similarly, these firms usually have difficulties with raising funds by issuing public securities since it is often quite expensive for them (Wehinger and Nassr 2015). Because of those reasons, innovative firms, entrepreneurial firms, small firms etc. are often considered pioneers in the area of raising start-up financing. The examples include venture capital finance, incubators/accelerators, angel financing, private equity etc. Crowdfunding is the latest development in this area. To start a crowdfunding campaign, an entrepreneur needs to visit a crowdfunding platform website and create a campaign. This can be done very quickly so information about the project can reach a very large set of potential investors in a matter of days. The flow of funds during crowdfunding is presented in Fig. 1.1.

There are four main types of crowdfunding: reward-based crowdfunding (used by Kickstarter and Indiegogo-the leading platforms in the area), equity-based crowdfunding, debt-based crowdfunding and donation-based crowdfunding.[6] In the case of reward-based crowdfunding, a non-financial reward is expected by the donor on behalf of the fund recipient, in return for their contribution. Rewards can vary from something simple such as a thank-you postcard or a T-shirt with a firm logo to a production version of the crowdfunded product. Equity-based crowdfunding is a financing method for young ventures and other commercial projects that support the acquisition of equity by coordinating the submission of different forms of shares to an undefined group of possible investors through social virtual communities. One of the differences related to the traditional equity financing is that equity investments in crowdfunding do not have an active secondary market although some crowdfunding platforms have been recently working on improving this area.[7] Under debt-based crowdfunding (also called P2P: peer-to-

[6]For more discussions related to different concepts of crowdfunding and terminology used see e.g. Brüntje and Gajda (2016), Kraus et al. (2016) and Assenmacher (2017). Also see crowdfunding blogs such as https://www.beauhurst.com/research/following-the-crowd/

[7]Seedrs—one if the two largest equity-based crowdfunding platforms- is launching its secondary market offering to all private businesses. See e.g. https://www.seedrs.com/learn/blog/the-seedrs-secondary-market-now-open-to-all-investors

peer lending), the debtor is supposed to return the money within a specific time period - the maturity date. In return for financing a project with an interest rate for the loan, the investor receives interest payments. In contrast to traditional debt financing where the debtor usually faces one creditor such as, for example, a commercial bank, in the case of debt-based crowdfunding, there are multiple creditors, and this may create different dynamics in the case of financial distress.[8] Under donation-based crowdfunding the donor is not expected to give any material or financial returns and no officially binding financial obligation is gained by fund recipients to donors. Literature on donation-based crowdfunding is not as popular as for other types of crowdfunding but it is growing.[9]

The term crowdfunding platform (see Fig. 1.1) can refer either to the organization or to the website that brings together companies seeking investment and investors with funds to invest.[10] Crowdfunding platforms that offer services for reward-based crowdfunding usually offer two types of campaigns: "All-Or-Nothing" (AON) and "Keep-It-All" (KIA). In the former, a campaign initiator does not keep any funds collected, without the funding target is reached (Cumming et al., 2020). In the latter, the campaign initiator can keep the entire collected amount, irrespective of whether the targeted goal is achieved or not (Cumming et al. 2020). Belleflamme et al. (2015) provide a good analysis of economics of crowdfunding platforms. In particular they argue crowdfunding platforms face the challenge to make relevant information easily available while at the same time to encourage information gathering. The largest crowdfunding platform Kickstarter offers services in reward-based crowdfunding by using the AON method. Indiegogo, the second largest platform, also deals with reward-based crowdfunding but was traditionally known for using the KIA method. In recent years Indiegogo has developed several innovative projects including offering a method choice to entrepreneurs and partnerships with firms like Amazon that provide special services for firms conducting crowdfunding (Amazon Launchpad).[11] Note also that the rates of success have been traditionally higher on Kickstarter (see e.g. Cumming et al. 2020). Dushnitsky et al. (2016) analyze the distribution of crowdfunding platforms across different countries in Europe. They found, for example, that the development of crowdfunding platform depends on country culture, including the Internet culture, entrepreneurial culture and the level of entrepreneurial activities (that reflects entrepreneurial spirit of crowdfunding). They also found that the development of debt-based (lending) crowdfunding platform depends on the level of competition in the finance industry and banking industry, which highlights direct and indirect links between crowdfunding and traditional ways of financing competing with each other.

[8]For an analysis of economics of debt-based crowdfunding see e.g. Milne and Parboteeah (2016).

[9]For a recent example see Cason and Zubrickas (2019).

[10]Examples of popular crowdfunding platforms include, among others, Kickstarter, Indiegogo, Crowdcube, Seedrs, etc.

[11]See e.g. https://www.woodshed.agency/blog/use-amazon-launchpad-after-your-successful-crowdfunding-campaign. Also see Miglo (2020).

When developing a crowdfunding campaign for their projects, entrepreneurs usually prepare a video (often called a video pitch or crowdfunding pitch), a short slogan and/or project description, a menu of prices and rewards (in the case of reward-based crowdfunding), select the type of campaign (AON or KIA), and if AON is selected, they should also select the level of threshold etc. An example of campaign that selected reward-based crowdfunding is Ocupulus Rift. They developed a virtual-reality (VR) headset for gamers. The CEO Palmer Luckey mentioned: "Kickstarter is the most visible crowdfunding platform out there, and it was clear that crowdfunding was a good match for the Rift. We knew that there was a passionate crowd of VR enthusiasts out there and that people want to take gaming to the next level, particularly developers. Kickstarter offered a great way to tap into that audience. The project was originally much smaller, but the massive amount of support we got let us scale way up".[12] An example of a campaign with equity-based crowdfunding is POD-point, an innovative firm that develops charging equipment/charging points for electric vehicles (EV). It is a very innovative risk-taking firm. The founder Eric Fairbairn mentioned that Crowdcube (an equity-based crowdfunding platform) provided an opportunity to invest in something that was fundamental to the UK's entrepreneurial endeavors (Hurst 2016). "We were attracted to equity crowdfunding as an innovative way to fund POD Point's growth that also allowed us to invite the electric vehicle community to become part of our journey. Like us, EV drivers are passionate about seeing the mass adoption of zero emissions transport in the UK and globally," said James McKemmy, head of the insights team at POD Point. "We thought it would be appealing and reflective of the wider community if those passionate about EV were able to help accelerate the growth of the charging infrastructure by investing in POD Point—and they seemed to agree," The business chose equity over reward-based crowdfunding because it wanted to give the EV community a chance to own a stake and benefit from its growth (Booty 2017).

Crowdfunding also represents a very active and dynamic informational structure (see Fig. 1.1). Unlike traditional financing, one of the main advantages of crowdfunding is "market feedback" i.e., the ability to collect useful information about their campaign and their products.[13] Even if a campaign fails, the entrepreneur may decide to revise their product and go ahead with another project and another crowdfunding campaign. Serial entrepreneurship is a growing area in theory and practice based in the idea of "learning by doing" (see e.g. He et al. 2020). The research shows that prior experience in crowdfunding has a positive effect on the crowdfunding success, and it usually concludes that entrepreneurs with a high number of successful project campaigns are more successful in subsequent projects

[12] https://www.popularmechanics.com/culture/gaming/a8990/10-questions-for-oculus-rift-ceo-palmer-luckey-15502842/

[13] See e.g., Xu (2017) or https://learn.indiegogo.com/benefits-of-crowdfunding-essential-guide/. Also, Miglo (2019) suggests that entrepreneurs can learn from observing the share price during equity-based crowdfunding. This model uses the elements of behavioral finance, i.e., overconfident entrepreneurs.

(see e.g., Greenberg and Gerber 2014; Courtney et al. 2017; Zhou et al. 2018; Janku and Kucerova 2018; Koch and Siering 2015, 2019).

The regulation of crowdfunding formally started with 2012 JOBS act in the United States that helped firms to raise different types of financing using on-line platforms without necessarily registering a prospectus etc. with the Security Exchange Commission (SEC).[14] That was followed by similar regulations in the UK, Canada and other countries. Some recent research also shows that the success of crowdfunding is positively correlated to the degree of regulation development in a given country (see e.g., Rau (2019)). Many questions have not been covered yet and it is a work in progress. For example, what happens (should happen) in the case of bankruptcy if the firm has both outstanding debt claims and unfinished crowdfunding projects. In this case who would/should have a priority etc.[15]

1.3 Asymmetric Information and Moral Hazard Issues in Crowdfunding

Early empirical papers on crowdfunding discovered that reward-based crowdfunding is subject to imperfect information and that mitigating that problem contributed to the success of projects (e.g., Mollick 2014). Crowdfunding success appears to be linked to project quality. Projects that signal a higher quality level are more likely to be funded, while a large number of friends on online social networks are similarly associated with success. Ahlers et al. (2015) find similar results in equity-based crowdfunding. Other papers include Hildebrand et al. (2016), Block et al. (2018), Piva and Rossi-Lamastra (2017), Vismara (2016).

Then theoretical literature started to create and analyze different models of crowdfunding. Some papers analyze situations where firm founders have more information than backers and suggest what the founders should do in order to mitigate the effects of imperfect information in the spirit of market failures models of Akerlof (1970) and Spence (1973). There are two approaches related to that. One of them is based on the idea that firms can significantly improve by trying to eliminate asymmetric information between them and their backers by publishing information, providing updates etc. Another approach is to recognize the fact that a significant degree of asymmetric information would exist anyway and then suggest some indirect actions that can send a signal to investors. Actually, theoretical literature in this area mainly uses the latter approach (similarly to the traditional debt/equity choice under asymmetric information). There are several reasons supporting that. One of them is a general rule that "actions speak louder than words" (with regard to crowdfunding actions may include, for example, the choice between crowdfunding and other types of financing or the choice of crowdfunding

[14] See e.g., https://econsultancy.com/the-crowdfund-act-everything-you-need-to-know/

[15] For more discussion see e.g., Tamburro (2018).

type or the choice of threshold, etc.). Secondly as found in some recent empirical papers (e.g., Liang et al. (2020)) publishing more information may not necessarily have linear/positive effect on the probability of success that again plays in favor of the latter approach.

Chakraborty and Swinney (2021) consider a crowdfunding model where product quality is known to the entrepreneur but not to some contributors. They find that a larger campaign target can be used by high-quality firms as a signaling device. Miglo and Miglo (2019) consider a situation with two consecutive rounds of financing and argue that reward-based crowdfunding can be used as a signal of quality when there is asymmetric information concerning either the cost of production or product quality. Low-quality firms may not be interested in mimicking high-quality firms when the latter use AON campaigns because the risk of their projects failing may be too high, which can be costly in the second period. Belleflamme et al. (2014) argue that asymmetric information reduces the value of reward-based crowdfunding to entrepreneurs. Uncertainty about a project's quality only partly hurts investors under equity-based crowdfunding since they count on long-term benefits but has a much more substantial negative impact on them under reward-based crowdfunding. Sayedi and Baghaie (2017) argue that setting a low campaign goal and a high pre-order price are credible tools for producers to signal their competence.

Empirical literature that directly tests the above papers is limited. However, they are consistent with the spirit of some results e.g., the results found in Ahlers et al. (2015) and Mollick (2014)—the firm's financing choice can serve as a signal of a project's quality e.g., the entrepreneur's larger fraction of equity is associated with a higher project quality. Also, Cumming et al. (2020) find that KIA campaigns are less successful in meeting their fundraising goals. For example, the rate of success of campaigns on Kickstarter, which only uses AON, is higher than in the case of Indiegogo.[16] Also, note that a majority of empirical papers usually find some positive effects of improving information about the project by entrepreneurs on the likelihood of crowdfunding success. It includes information quantity- i.e. words, pictures and videos (see e.g. Zhou et al. (2018), Lagazio and Querci (2018), Kunz et al. (2016), Xu (2018), Bi et al. (2017), Moy et al. (2018), De Larrea et al. (2019), Yeh et al. (2019)), and information quality i.e. to what extent the project information is readable, measured e.g., by readability and the frequency of information update, information attitude, i.e. the backers' opinions or questions about the projects and the creators' replies, comments, information about entrepreneur's experience with crowdfunding etc. (see e.g., Zhou et al. 2018; Mollick 2014; Davies and Giovannetti 2018; Shahab et al. 2019; De Larrea et al. 2019; Yeh et al. 2019; Lagazio and Querci 2018; Bi et al. 2017). As we mentioned previously, some recent research finds mixed evidence about opportunities for successful direct signaling in crowdfunding and some research finds an inverted U-shape relationship between the amount of information and the probability of the project success (see e.g., Liang et al. 2020).

[16]See, for example: http://crowdfunding.cmf-fmc.ca/facts_and_stats/how-likely-is-your-crowdfunding-campaign-to-succeed

Another line of literature assumes that some investors are better informed than others. This literature usually focuses on the analysis of third-party signals of crowdfunding and also such phenomena as backers herding behavior. Theoretical papers include Cong and Xiao (2018) that find that an AON target prevents agents' ignoring private signals and imitating preceding agents' rejections. Consequently, information aggregation improves. Asterbo et al. (2020) analyze herding in equity crowdfunding. They argue that when investors see that a particular project willing to be supported by a huge number of investors, they also believe in that idea, and express the desire to help this project be realized. Kleinert et al. (2020) provide evidence that prior financing certifies firm quality to investors and reduces information asymmetries in equity crowdfunding. Kim et al. (2018) present a model of choice of backer behavior on a large crowdfunding platform and show that the funding status positively affects the backer's utility before the funding goal is met. Other papers Chan et al. (2020), Courtney et al. (2017), Kim and Viswanathan (2019), Kupuswamy, Steigenberger and Wilhelm (2018), Zhang and Liu (2012).

In general, this literature showed, in many different ways, the importance of imperfect and asymmetric information in crowdfunding. It also suggested some ways to deal with those problems although it is clear that no ideal and/or simple solution exists for those problems. Many researchers conclude that in crowdfunding it is very typical for projects to attract very low or negligibly small amounts of funds (see, for example, Mollick 2014; Cordova et al. 2015; Desjardins 2016). Also, as it was mentioned previously, there is a gap between theoretical and empirical papers.

Similar trends are observed in the area of moral hazard research. Earlier empirical papers (e.g., Cumming et al. 2016) discovered that many campaigns suffered from funds embezzlements. Then, several theoretical papers were published. Those papers were usually focused on one of the two forms of moral hazard problems: monitoring problems related to the level of efforts provided by entrepreneur (e.g. Schwienbacher 2018; Babich et al. 2021; Miglo and Miglo 2019) and those related to the potential misusage of funds received during crowdfunding campaigns (e.g., Strausz 2017; Chemla and Tinn 2020; Belavina et al. 2020).

Strausz (2017)) studies entrepreneurs' interactions with customers with focus on moral hazard problems. It is argued that under demand uncertainty, crowdfunding improves to analyze (screen) projects' qualities. However, the cost of crowdfunding is moral hazard of entrepreneurs conducting crowdfunding campaigns. Crowdfunding's after-markets enable consumers to actively implement deferred payments that can create an efficient mechanism of dealing with moral hazard. Strausz (2017) also argues that efficiency is sustainable only if returns exceed investment costs by a margin reflecting the degree of moral hazard.

Chemla and Tinn (2020) consider a model where an entrepreneur has an ability to divert funds collected during crowdfunding. They argue that crowdfunding has benefits of learning uncertain market demand. Also, higher amounts of funds raised while crowdfunding mitigate the chance that funds will be diverted by the entrepreneur.

Schwienbacher (2018) analyzes the role of entrepreneurial moral hazard in the choice between crowdfunding (AON) and venture capital. They find that under

AON, optimal strategies for the firm are either to establish a high threshold and provide a high level of effort or a low threshold and a low effort.

Babich et al. (2021) study an optimal financing strategy for a start-up that includes a mix of crowdfunding as well as venture capital (VC) and bank financing. They model a bargaining game, with a moral-hazard problem between an entrepreneur and a bank, and a double-sided moral-hazard problem between the entrepreneur and a VC, with respect to their non-contractible efforts. Similarly to the spirit of the analysis above, when designing a crowdfunding campaign the entrepreneur should take into account the after-campaign consequences including opportunities to get VC or bank financing.

Ellman and Hurkens (2017) provide a simple example of a crowdfunding design that raises profit and welfare by tolerating some fraud risk. This shows how cross-subsidizing between cost states relaxes the most restrictive moral hazard constraints and generates better outcomes. They also characterize the optimal mechanism in the case of one consumer and two cost states. In general, this must hide information, including prices, from consumers. Hence, crowdfunding cannot implement those optima.

Belavina et al. (2020) analyze the choice between reward-based crowdfunding and bank financing by focusing on two risks: entrepreneurs may run away with backers' money and product specifications may be misrepresented. They show that each of these risks can amplify their individual adverse effects. Belavina et al. (2020) analyze a total of ten different mechanisms and show that two of them dominate: the early stopping mechanism, and the escrow mechanism with mandatory ex-post verification.

In general, in that literature some useful suggestions are made to explain some features of crowdfunding campaigns and regulations e.g., the usefulness of establishing a threshold and delaying the releasing of funds to entrepreneurs that is usually used by crowdfunding platform that practice AON.[17] However, there is still a large gap between empirical and theoretical papers. Most theoretical papers have not yet been directly tested. Although some of their predictions are consistent with evidence e.g., the point that moral hazard issues related to the entrepreneurial cost of effort and the reduced equity stake are more important under equity-based crowdfunding is consistent with Gabison (2015) and Paakkarinen (2016) who noted that equity-based crowdfunding is much more constricted in comparison to other forms of crowdfunding.

Finally, note that overall conclusion is that moral hazard represents an important aspect of crowdfunding. There is not an easy way to solve the problem completely. In most cases, it affects the outcome of campaigns negatively. For example, Ellman and Hurkens (2017) characterize the optimal mechanism in the case of one consumer and two cost states and argue that crowdfunding cannot implement those optima. Schwienbacher (2018) finds that under AON, sensible strategies for the firm are

[17] See e.g., https://help.kickstarter.com/hc/en-us/articles/360010120934-If-my-project-is-successfully-funded-how-do-I-receive-my-funds

either to establish a high threshold and provide a high level of effort or a low threshold and a low effort. Babich et al. (2021) find that VCs can walk away after successful crowdfunding campaigns, which is consistent with Hong and Ryu (2018). Babich et al. (2021) also find that projects that may not be beneficial if crowdfunding succeeds are likely to be ones with relatedly low external capital required. Miglo and Miglo (2019) find that pricing and production strategies of firms that use crowdfunding are affected by moral hazard issues—especially with regard to equity-based crowdfunding because under equity-based crowdfunding the fraction of shares owned by the entrepreneur is reduced (in the spirit of Jensen and Meckling 1976). Belavina et al. (2020) show that risks related to moral hazard problems can amplify their individual adverse effects. Belavina et al. (2020) then analyze a total of ten different mechanisms and show that two of them dominate: the early stopping mechanism, and the escrow mechanism with mandatory ex-post verification.

All in all, the following three points are worth mentioning with regard to imperfect information and moral hazard issues in crowdfunding: (1) they are found to be important in both theoretical and empirical literature; (2) some direct and indirect methods can be used by entrepreneurs to mitigate the importance of these problems; (3) a complete elimination of these problems is very unlikely.

1.4 Crowdfunding in the Public Sector

As it was mentioned in the previous section, crowdfunding faces problems associated with asymmetric information and moral hazard that may have negative effect on the results of some campaigns and ultimately on the development of crowdfunding in general. So, there is role for government to play—a role that is similar to the role described in the literature devoted to market failures. Government can help improve the outcome (see e.g., Akerlof 1970; Oates 1972; Stiglitz 1993). In addition, Belleflamme et al. (2013) argue that non-profit organizations tend to be more successful in using crowdfunding. They also suggest that this is in line with theoretical arguments developed by the contract failure literature that postulates that nonprofit organizations may find it easier to attract money for initiatives that are of interest for the general community due to their reduced focus on profits—this is based on Ghatak and Mueller (2011), Glaeser and Shleifer (2001), Bilodeau and Slivinski (2004). This is because profit incentives might lead to undesirable outcomes from the point of view of donors who value the non-contractible outcome of the entrepreneurial venture.

Also, some research explains network benefits of crowdfunding. Crowdfunding process is by nature very different from traditional ways of raising funds. These differences include mutual exchange of information, “social value” feeling from joining a large group of people driven by similar interests, opportunities to solve coordination problems between large number of participants etc. In many cases some financial rewards for investors and non-financial rewards for the community are both obtained (see e.g., Belleflamme et al. 2014). Hence, it is often considered as

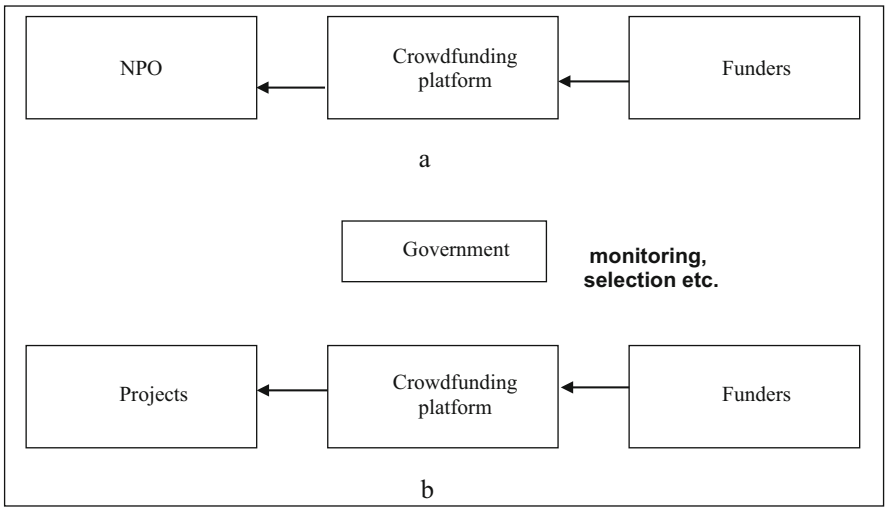

Fig. 1.2 Crowdfunding framework in public sector: (**a**) Type 1; (**b**) Type 2

a helpful tool for developing and delivering public goods (Hudik and Chovanculiak 2018; Wenzlaff 2020). These features of crowdfunding can also justify the role of government in using crowdfunding as a network/community tool that is often perceived to be almost a public good. In fact, this tool can be a more efficient way of managing public goods as compared to traditional ways including taxation. For example, the amount of money raised by crowdfunding may serve as a signal of community demand for the products/projects. This is similar to the idea of using crowdfunding by private firms to learn the demand for their products. A closely related idea can be found in Lenart-Gansiniec and Sułkowski (2018). They argue that crowdsourcing is important for the organizational learning of public organizations. This is because organizational learning is a prerequisite for running contemporary policies and ensuring sustainable development of public organizations. Lenart-Gansiniec and Sułkowski (2018) argue that sustainable development as well as organizational learning of public organizations are based on cooperation with citizens and their inclusion in decision-making, and also on using information technology and communication technologies.[18]

Crowdfunding in public sector exists in two forms. The former (call it Type 1) is related to crowdfunding used by NPOs. See Fig. 1.2.

Under this scheme, nonprofit organizations (NPOs) use crowdfunding for a given social problem and collect contributions from a large number of funders. NPOs use their expertise to propose creative and specific solutions for solving the social problems set forth by the government. The latter (Type 2) is observed when the

[18]See Adamo et al. (2020) for an analysis of crowdfunding in Italy that includes among others an analysis of crowdfunding in public sector (civic crowdfunding).

government directly collaborates or participates in the project. See Fig. 1.2. Type 2 enables a new form of collaborative governance in which stakeholders pool their innovation assets to develop joint solutions for social problems. Specifically, the government oversees the whole process while steering the overall direction of social investments and signaling that a project aims to achieve both social and private goals. Governments' use of crowdfunding may be regarded as a public sector innovation with normative and economic benefits.

An example of research on Type 1 is provided by Belleflamme et al. (2013) who present a theoretical model and empirical analysis. They first note that in many cases non-profit funders' investments may include involvement in the organization, which in turn may increase the level of community benefits provided to funders. They illustrate this point with two examples. The South African singer, Verity Price, produced her album through her own crowdfunding campaign. She set up a website where over 2000 crowdfunders participated in the creative content of her album by having a say regarding, e.g., songs recorded, and artworks used. The crowdfunders of MyFootball Club are actively associated with the management of their football club by voting, among others, on budget, club officials, kit supplier contracts, and transfer deals. Belleflamme et al. (2013) argue that nonprofit organizations are significantly more likely to achieve their target level of capital in comparison with other organizational forms such as a corporation and freelance. Their empirical analysis confirms their theoretical result.

An example of Type 2 analysis refers to Hong and Ryu (2018) that analyze crowdfunding in Korea.[19] They find that in Korea, a large number of local and central government agencies have started to actively use crowdfunding platforms to fund various projects that could potentially contribute to public missions. They argue that government involvement has significant positive impacts on crowdfunding performance, as measured by success rate and funding amount. They argue that the participation of government agencies could improve crowdfunding performance by mitigating the information asymmetry between the creator (i.e., the private sector organization) and funders (i.e., the crowd). Specifically, they argue that government involvement provides some type of accreditation or certification that attests that crowdfunding projects truly aim to achieve public rather than private goals, ultimately improving citizens' trust in the projects. This study's evidence is based on observations from Korea's largest crowdfunding platform, Wadiz. The government's primary function is to determine areas for their involvement and perform "screening" (i.e., the selection of projects that are feasible and may contribute to public missions). Specifically, the government first announces some broad areas of support and involvement (e.g., promotion of well-being in rural regions). They then solicit creative solutions from private sector organizations and conducts reviews of crowdfunding proposals.

Although there are potential advantages of government involvement, there are some potential issues. Governments can use the new technology to privatize public

[19]Other examples include Lee et al. (2016) and Miglietta et al. (2014).

services. This can reduce the quality of public services (e.g., Van Slyke 2006). What is more, governments can choose certain social problems while discriminating against others. Previous research found some evidence that the use of local option sales taxes could create fiscal disparity across localities (Afonso 2016; Zhao and Hou 2008). Therefore, a similar issue may emerge regarding the government's use of crowdfunding if the fundraising is more successful in communities with high income than in those with low income.

Overall, crowdfunding in the public sector is an interesting area of research and practice in different parts of the world. There are different forms of public participation and government involvement in the crowdfunding process. There are some potential advantages of government participation in crowdfunding primarily related to different market imperfections including imperfect information and moral hazard issues. Some issues though should be addressed before undertaking crowdfunding in the public sector related to potential costs of government involvement.

1.5 Conclusion

This chapter provides an overview of the basic concepts of crowdfunding and discusses its foundations and backgrounds. It also discusses the basic and the main frameworks of crowdfunding in the public sector. We discuss the historical background of crowdfunding and the new wave of interest in the phenomenon which was raised as a result of significant difficulties experienced by innovative and entrepreneurial firms in raising funds using traditional methods and technical developments including internet, on-line technologies and FinTech. Crowdfunding belongs to a new type of financial services that connects suppliers of capital and its users directly, which is similar to other areas of Fintech that do not rely on traditional financial intermediaries such as commercial banks for example.[20] The immense level of interest in crowdfunding has been manifested in quickly growing amounts of capital raised using this method of financing over the last 10–15 years. It has also created a large amount of theoretical interest.

We discuss the main theoretical and empirical topics of research in crowdfunding with a particular focus on imperfect information and moral hazard problems in crowdfunding. On one hand potential investors can quickly access information about the project of their interest but on the other hand, the depth and quality of this information is hard to verify. The analysis in this chapter helps readers understand and compare the main advantages and disadvantages of crowdfunding and explain why the likelihood of crowdfunding success is usually positively correlated with direct and indirect signals sent to investors by entrepreneurs. It also explains the difficulties in eliminating the problem of imperfect information completely.

[20]FinTech offers similar approach in other areas of finance such as payments using cryptocurrencies.

Similarly, firms conducting crowdfunding are subjects to moral hazard problems where the control of entrepreneurial actions is a challenging issue. Many crowdfunding campaigns fail and are not able to deliver goods promised to investors. This chapter discussed the above trade-offs that help explain some ideas behind government participation and intervention in crowdfunding.

Government participation can help increase the trust in crowdfunding as well as increase public benefits from crowdfunding. We also discussed that many crowdfunding projects provide either public goods or have elements of both private financial benefits for investors as well as public benefits for the community. We also consider two frameworks that exist regarding crowdfunding in the public sector: the former which involves non-profit originators and the latter that involves government direct participation. Under the former, NPOs may have improve the firm's incentives as compared to traditional businesses. Under the latter approach, government involvement in crowdfunding provides some type of accreditation that attests to a project's aim to achieve public rather than private goals, thereby mitigating information asymmetry and improving mutual trust between creators (i.e., private sector organizations) and funders (i.e., crowd). Crowdfunding projects with government involvement may achieve a greater success rate and attract a greater amount of funding than comparable projects without government involvement. We also discuss potential disadvantages of government involvement in crowdfunding. Our main conclusion is that future research is required to weight the benefits and costs of government participation in crowdfunding and more research is expected in this area.

Acknowledgements The authors gratefully acknowledge the helpful comments and suggestions of the reviewers, which have improved the presentation.

References

Adamo R, Federico D, Intonti M, Mele S, Notte A (2020) Crowdfunding: the case of Italy, working paper

Afonso, W (2016) The equity of local sales tax distributions in urban, suburban, rural, and tourism rich counties in North Carolina. Public Financ Rev 44(6):691–721

Ahlers G, Cumming D, Guenther C, Schweizer D (2015) Signaling in equity crowdfunding. Entrep Theory Pract 39(4):955–980

Akerlof GA (1970) The market for "lemons": qualitative uncertainty and the market mechanism. Am Econ Rev 72(3):388–400

Alegre I, Moleskis M (2016) Crowdfunding: a review and research agenda. Working paper. https://doi.org/10.2139/ssrn.2900921

Assenmacher K (2017) Crowdfunding als kommunale Finanzierungsalternative. Springer, Wiesbaden

Asterbo TB, Fernández Sierra M, Lovo S, Vulkan N (2020) Herding in equity crowdfunding. Working papers 34, Red Investigadores de Economía

Babich V, Marinesi S, Tsoukalas G (2021) Does crowdfunding benefit entrepreneurs and venture capital investors? Manufacturing & Service Operations Management 23(2):508–524.

BBC Online (2013) The statue of liberty and America's crowdfunding pioneer. April 24, 2013

Belavina E, Marinesi S, Tsoukalas G (2020) Rethinking crowdfunding platform design: mechanisms to deter misconduct and improve efficiency. Management Science 66(11): 4980–4997.
Belleflamme P, Lambert T, Schwienbacher A (2013) Individual crowdfunding practices. Venture Capital 15(4):313–333
Belleflamme P, Lambert T, Schwienbacher A (2014) Crowdfunding: tapping the right crowd. J Bus Ventur 29(5):585–609
Belleflamme P, Omrani N, Peitz M (2015) The economics of crowdfunding platforms information economics and policy 33. https://doi.org/10.1016/j.infoecopol.2015.08.003
Bi S, Liu Z, Usman K (2017) The influence of online information on investing decisions of reward-based crowdfunding. J Bus Res 71:10–18
Bilodeau M, Slivinski A (2004) Rational nonprofit entrepreneurship. J Econ Manag Strategy 7:551–571
Block J, Hornuf L, Moritz A (2018) Which updates during an equity crowdfunding campaign increase crowd participation? Small Bus Econ 50:3–27
Booty L (2017) Equity or reward-based crowdfunding? Hear from both sides to make your mind up. https://realbusiness.co.uk/equity-reward-based-crowfunding-hear-sides-make-mind/
Brüntje D, Gajda O (2016) Crowdfunding in Europe state of the art in theory and practice
Cason TN, Zubrickas R (2019) Donation-based crowdfunding with refund bonuses. Eur Econ Rev 119(C):452–471. https://doi.org/10.1016/J.EUROECOREV.2019.08.003
Chakraborty S, Swinney R (2021) Signalling to the crowd: private quality information and rewards-based crowdfunding. Manufacturing and Service Operations Management 23(1):155–169
Chan CR, Parhankangas A, Sahaym A, Oo P (2020) Bellwether and the herd? Unpacking the u-shaped relationship between prior funding and subsequent contributions in reward-based crowdfunding. J Bus Ventur 35(2):105934
Chemla G, Tinn K (2020) Learning through crowdfunding, Management Science 66 (5):1783–1801.
Cong L, Xiao Y (2018) Up-cascaded wisdom of the crowd. https://financetheory.org/wp-content/uploads/gravity_forms/1-70ba24ead09917a027e3e47d3324b973/2018/02/UCWC-Cong-Xiao-2018.pdf
Cordova A, Dolci J, Gianfrate G (2015). The determinants of crowdfunding success: evidence from technology projects. Procedia Soc Behav Sci 181(11):115–124.
Courtney C, Dutta S, Li Y (2017) Resolving information asymmetry: signaling, endorsement, and crowdfunding success. Entrep Theory Pract 41(2):265–290
Cumming D, Hornuf L (2018) The economics of crowdfunding startups, portals and investor behavior. Palgrave Macmillan, New York
Cumming D, Johan S (2017) Crowdfunding and entrepreneurial internationalization, Chap. 5. In: The World Scientific Reference on Entrepreneurship, pp 109–126
Cumming D, Hornuf L, Karami M, Schweizer D (2016) Disentangling crowdfunding from fraudfunding, Max Planck Institute for Innovation & Competition Research Paper, No. 16-09.
Cumming D, Leboeuf G, Schwienbacher A (2020) Crowdfunding models: keep-it-all versus all or nothing. Financial Manag 49(2):331–360
Das S (2019) The future of FinTech. Financ Manag 48(4):981–1007
Davies W, Giovannetti E (2018) Signaling experience & reciprocity to temper asymmetric information in crowdfunding evidence from 10,000 projects. Technol Forecast Soc Chang 133:118–131
De Larrea GL, Altin M, Singh D (2019) Determinants of success of restaurant crowdfunding. Int J Hosp Manag 78:150–158
Desjardins J (2016, July 14) 19 weird crowdfunding campaigns that failed spectacularly. http://www.visualcapitalist.com/19-weird-crowdfundingcampaigns-failed/
Dushnitsky G, Guerini M, Piva E, Rossi-Lamastra C (2016) Crowd funding in Europe: determinants of platform creation across countries. California Manag Rev 58(2):44–71. https://doi.org/10.1525/cmr.2016.58.2.44

Ellman M, Hurkens JPM (2017) A theory of crowdfunding a mechanism design approach with demand uncertainty and moral hazard: comment. http://www.iae.csic.es/investigatorsMaterial/a1812160140sp40258.pdf

Estrin S, Gozman D, Khavul S (2018) The evolution and adoption of equity crowdfunding: entrepreneur and investor entry into a new market. Small Bus Econ 51(2):425–439

Gabison G (2015) Understanding crowdfunding and its regulations. http://publications.jrc.ec.europa.eu/repository/bitstream/JRC92482/lbna26992enn.pdf

Ghatak M, Mueller H (2011) Thanks for nothing? Not-for-profits and motivated agents. J Public Econ 95:94–105

Glaeser EL, Shleifer A (2001) Not-for-profit entrepreneurs. J Public Econ 81:99–115

Greenberg MD, Gerber E (2014) Learning to fail: experiencing public failure online through crowdfunding. In Proceedings of the 32nd annual ACM Conference on Human Factors in Computing Systems, New York, 4–9 May 2014, pp. 581–590

He H, Bai Y, Xiao X (2020) How past failure predicts subsequent entrepreneurial intention: a comparative study of Mainland China and Taiwan. Sustainability 2020(12):2331

Hildebrand T, Puri M, Rocholl J (2016) Adverse incentives in crowdfunding. Manag Sci 63 (3):587–608

Hong S, Ryu J (2018) Crowdfunding public projects: collaborative governance for achieving citizen co-funding of public goods. Gov Inf Q 36(1)

Hudik M, Chovanculiak R (2018) Private provision of public goods via crowdfunding. J Inst Econ 14(1):23–44

Hurst S (2016) Pod Point's Erik Fairbairn reveals why he is investing in crowdcube. https://www.crowdfundinsider.com/2016/07/88567-pod-points-erik-fairbairn-reveals-investing-crowdcube/

Janku J, Kucerova Z (2018) Successful crowdfunding campaigns: the role of project specifics, competition and founders' experience. Czech J Econ Finance 68:351–373

Jensen M, Meckling W (1976) Theory of the firm: managerial behavior, agency costs and ownership structure. J Financ Econ 3:305–360

Jensen LS, Özkil AG (2018) Identifying challenges in crowdfunded product development: a review of kickstarter projects design science 4, e18. https://doi.org/10.1017/dsj.2018.14

Kim K, Viswanathan S (2019) The 'experts' in the crowd: the role of experienced investors in a crowdfunding market. Mis Q 43(2): 347–372

Kim JH, Newberry P, Qiu C (2018) The role of information signals in determining crowdfunding outcomes. https://www.tse-fr.eu/sites/default/files/TSE/documents/ChaireJJL/Digital-Economics-Conference/Conference/kim_jin-hyuk.pdf

Kleinert S, Volkmann C, Grünhagen M (2020) Third-party signals in equity crowdfunding: the role of prior financing. Small Bus Econ 54:341–365

Koch J-A, Siering M (2015) Crowdfunding success factors: the characteristics of successfully funded projects on crowdfunding platforms. In: Paper presented at Twenty-Third European Conference on Information Systems (ECIS), Münster, Germany, May 26–29

Koch J-A, Siering M (2019) The recipe of successful crowdfunding campaigns: an analysis of crowdfunding success factors and their interrelations. Electron Mark 29:661–679

Kraus S, Richter C, Brem A, Cheng C-F, Chang M-L (2016) Strategies for reward-based crowdfunding campaigns. J Innov Knowl 1(1):13–23

Kunz MM, Bretschneider U, Erler M, Leimeister JM (2016) An empirical investigation of signaling in reward-based crowdfunding. Electron Commer Res 2016(17):425–461

Kuppuswamy V, Bayus B (2015) A review of crowdfunding research and findings. Handbook of new product development research, working paper

Lagazio C, Querci F (2018) Exploring the multi-sided nature of crowdfunding campaign success. J Bus Res 90:318–324

Lambert T, Schwienbacher A (2010) An empirical analysis of crowdfunding. Available at SSRN http://ssrn.com/abstract=1578175

Lee CH, Zhao JL, Hassna G (2016) Government-incentivized crowdfunding for one-belt, one-road enterprises: design and research issues. Financ Innov 2(1):2. https://doi.org/10.1186/s40854-016-0022-0
Lenart-Gansiniec R, Sułkowski Ł (2018) Crowdsourcing—a new paradigm of organizational learning of public organizations. Sustainability 10:3359. https://doi.org/10.3390/su10103359
Liang X, Hu X, Jiang J (2020) Research on the effects of information description on crowdfunding success within a sustainable economy—the perspective of information communication. Sustainability 12:650
Miglietta A, Parisi E, Pessione M, Servato F (2014) Crowd funding and local governments: a financial opportunity for a new liaison with citizens. In Proceedings of the Toulon-Verona Conference "Excellence in Services."
Miglo A (2019) Crowdfunding under market feedback, asymmetric information and overconfident entrepreneur. Entrep Res J, working paper version: https://mpra.ub.uni-muenchen.de/89015/1/MPRA_paper_89015.pdf
Miglo A (2020) Crowdfunding in a competitive environment. J Risk Financial Manag 13:39
Miglo A, Miglo V (2019) Market imperfections and crowdfunding. Small Bus Econ J 53(1):51–79
Milne A, Parboteeah P (2016) The business models and economics of peer-to-peer lending. https://doi.org/10.2139/ssrn.2763682
Mochkabadi K, Volkmann C (2020) Equity crowdfunding: a systematic review of the literature. Small Business Econ 54(1):75–118.
Mollick E (2014) The dynamics of crowdfunding: an exploratory study. J Bus Ventur 29(1):1–16
Moores C (2015) Kickstart my lawsuit: fraud and justice in rewards-based crowdfunding lawreview.law.ucdavis.edu › Note › 49-1_Moores
Moritz A, Block J (2014) Crowdfunding: a literature review and research directions. Available at SSRN http://ssrn.com/abstract=2554444
Moy N, Chan HF, Torgler B (2018) How much is too much? The effects of information quantity on crowdfunding performance. PLoS One 2018(13):e0192012
Oates WE (1972) Fiscal federalism. New York, Harcourt Brace Jovanovich
Paakkarinen P (2016) Success factors in reward based and equity based crowdfunding in Finland Master's thesis
Piva E, Rossi-Lamastra C (2017) Human capital signals and entrepreneurs' success in equity crowdfunding. Small Bus Econ 51:667–686
Rau PR (2019, July 1) Law, trust, and the development of crowdfunding. Available at SSRN https://ssrn.com/abstract=2989056
Sayedi A, Baghaie M (2017, March 20) Crowdfunding as a marketing tool. Available at SSRN https://ssrn.com/abstract=2938183
Schwienbacher A (2018) Entrepreneurial risk-taking in crowdfunding campaigns. Small Bus Econ 51(4):843–859
Shahab Y, Ye Z, Riaz Y, Ntim CG (2019) Individual's financial investment decision-making in reward-based crowdfunding: evidence from China. Appl Econ Lett 26:261–266
Simons O (2016, March 11) "Crowdfunding Comte". positivists.org. Retrieved 11 March 2016
Spence M (1973) Job market signaling. Q J Econ 87(1973):355–374
Steigenberger N, Wilhelm H (2018) Extending signaling theory to rhetorical signals: evidence from crowdfunding. Organ Sci 29(3):529–546
Stiglitz J (1993) The role of the state in financial markets. World Bank Rev 7(1):19–52. https://doi.org/10.1093/wber/7.suppl_1.19
Stiglitz J, Weiss A (1981) Credit rationing in markets with imperfect information. Am Econ Rev 71 (3):393–410
Strausz R (2017) Crowdfunding, demand uncertainty, and moral Hazard - a mechanism design approach. Am Econ Rev 107(6):1430–1476
Tamburro A (2018) Far from madding crowd: crowdfunding a small business reorganization. EMORY Bankruptcy Dev J 34:521–559

Van Slyke, DM (2006) Agents or stewards: using theory to understand the governmentnonprofit social service contracting relationship. J Public Adm Res Theory 17(2):157–187
Vismara S (2016) Equity retention and social network theory in equity crowdfunding. Small Bus Econ 46(4):579–590
Wehinger G, Nassr I (2015) Opportunities and limitations of public equity markets for SMEs. OECD J Financial Market Trends 2015(1):49–84
Wenzlaff K (2020) Civic crowdfunding: four perspectives on the definition of civic crowdfunding. In: Shneor R, Zhao L, Flåten BT (eds) Advances in crowdfunding. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-030-46309-0_19
Xu T (2017) Learning from the crowd: the feedback value of crowdfunding, University of British Columbia
Xu LZ (2018) Will a digital camera cure your sick puppy? Modality and category effects in donation-based crowdfunding. Telemat Inf 35:1914–1924
Yeh T-L, Chen T-Y, Lee C-C (2019) Investigating the funding success factors affecting reward-based crowdfunding projects. Innovations 21:466–486
Zhang J, Liu P (2012) Rational herding in microloan markets. Manag Sci 58(5):892–912
Zhao ZJ, Hou Y (2008) Local option sales taxes and fiscal disparity: the case of georgia counties. Public Budg Financ 28(1):39–57
Zhou M, Baozhou L, Weiguo F, Wang A (2018) Project description and crowdfunding success: an exploratory study. Inf Syst Front 20:259–274

Chapter 2
Crowdfunding in Public Sector: A Systematic Literature Review

Regina Lenart-Gansiniec

Abstract In recent years, crowdfunding has become important and it has been enthusiastically used not only by commercial organizations but also by the public sector. This study organizes existing research on the crowdfunding in the public sector in order to investigate the current state and what value e-government is supposed to yield. Despite the importance and relevance of the topic, deficiencies related to a comprehensive review of crowdfunding in the public sector are noticed. The aim of the article is to synthesize the previous crowdfunding research in the context of the public sector. A systematic literature review was used, including, as a bibliometric technique, frequency and content analysis. The subject literature was selected on the basis of foreign scientific databases, such as: Web of Science and Scopus. The analysis covered 64 articles on crowdfunding in public organizations published from 2006 to 2018. Based on a systematic literature review, a theoretical framework for future research on crowdfunding in the public sector is developed in the context of the ways of crowdfunding defining and operationalizing, crowdfunding types, goals of crowdfunding, antecedents of crowdfunding, and outcomes of crowdfunding. Regarding the current state of research into the crowdfunding in the public sector this study is based on the research including existing theories and socio-economic, financial, behavioral, and regulatory perspectives. There is also a lack of comparative studies on the national level.

Keywords Crowdfunding · Public sector · Systemic review

R. Lenart-Gansiniec (✉)
Jagiellonian University in Kraków, Kraków, Poland
e-mail: regina.lenart-gansiniec@uj.edu.pl

R. Lenart-Gansiniec, J. Chen (eds.), *Crowdfunding in the Public Sector*,
Contributions to Finance and Accounting,
https://doi.org/10.1007/978-3-030-77841-5_2

2.1 Introduction

First and foremost, as used in this article, the concept "crowdfunding in public sector" is defined as "a collective effort by people who network and pool their money together, usually via the Internet, in order to invest in and support efforts initiated by other people or organizations" (Ordanini et al. 2011). In the public sector context, crowdfunding is the funding of projects which, directly or indirectly, benefit from government funds, assets, or sponsorship, and may include the development of public assets (Davies 2015). It is expected that crowdfunding as an example of process innovation and innovation in public sector management (De Vries et al. 2016) will help in solving social problems (Lee et al. 2016; Miglietta et al. 2014; Hong and Ryu 2018) and to carry forward politically contentious services. This alternative source of financing in times of constrained government budgets enables citizens to vote with their dollars online to bring ideas into reality (Hong and Ryu 2018). Crowdfunding in the public sector is connected with cooperation-based innovations (Bryson et al. 2006; Austin and Seitanidi 2012; Hong and Kim 2018) and contemporary trends in public sector management, in particular participatory civic, participatory democracy model (Barber 2003), digital democracy (Fuchs 2006), open government, e-collaboration, citizen consultations (Harrison et al. 2012), peer review (Noveck 2009). In addition, it facilitates citizens' engagement, establishing contacts and encouraging them to cooperate with the public sector. It is also a mechanism which facilitates participatory budgeting (Lee et al. 2016).

Insofar as crowdfunding in the private sector seems fairly well-grounded in theory (Butticè et al. 2017: Moritz and Block 2016; Pichler and Tezza 2016), it remains an original and interesting research area (Stiver et al. 2015) in the public sector, despite the constant growth of publications. Nevertheless, there is a lack of a deeper grinding in theoretical areas of influence and future direction (Leonard 2013). There are still questions about what it is, what topics have been raised in current research and what are the possible pathways for future research (De Vries et al. 2016; Mayer 2016; Miglietta et al. 2014). Understanding the nature of crowdfunding in the context of the public sector will maximize the benefits of its use (Hong and Ryu 2018). In particular, that in recent years there has been an increase in the number of platforms, their diversity and global reach (Massolution 2013), which is a response to government references (London Councils 2013).

The research aim is to synthesize previous research on crowdfunding in the public sector and to identify different ways of defining types, operationalization, goals of crowdfunding, antecedents of crowdfunding and outcomes of crowdfunding in the world literature. The research questions are:

RQ1. What crowdfunding definitions in the public sector are used?
RQ2. What types of crowdfunding in the public sector can be distinguished?
RQ3. What are the goals of crowdfunding in the public sector?
RQ4. Which antecedents influence the public sector crowdfunding?
RQ5. What are the outcomes of the public sector crowdfunding?

We answer these questions by means of a systematic review. A systematic review of the literature was conducted in order to analyze 64 scholarly articles on crowdfunding in the public sector, which were published in international databases between 2011 and 2019. This study contributes to current literature in three ways. First, we chose a systematic review of literature in order to make a synthesis of earlier studies on crowdfunding in the public sector (Moher et al. 2009). The adopted method is, in contrast to traditional literature reviews, more reproducible, explicit, rigorous, transparent, and it also reaches for standardized techniques for the identification of relevant research. Owing to that, it allows to "minimize researcher bias regarding the inclusion or exclusion of studies and to clearly channel how and to what extent the review was performed through transparency" (Karaosman et al. 2017). Moreover, in publications devoted to the public sector, a systematic literature review has been an increasingly popular method (Tummers et al. 2015; De Vries et al. 2016).

Secondly, there is no complete review of literature on crowdfunding in the public sector. This systematic literature review is the first one that focuses on the public sector. The previous systematic reviews of crowdfunding literature focused on elements of a successful crowdfunding campaign (Kaartemo 2017), perspectives (Mochkabadi and Volkmann 2018), identification of economic benefits and risks in the health market, the use of crowdfunding in shaping entrepreneurship (Short et al. 2017), motivation, determining factors, legal framework, capital providers (Moritz and Block 2016), Crowdfunder decisions and behaviors before and after investment. In turn, Bachmann et al. (2011) in their literature review omitted crowdfunding issues and concentrated on peer-to-peer loans. Whereas Feller et al. (2013) structure crowdfunding research according to various forms of crowdfunding without taking into consideration the specific content of this research. Ghezzi et al. (2017) explicitly excluded crowdfunding from a systematic literature review. In contrast, Pichler and Tezza (2016) reviewed the literature on crowdfunding, in particular in the context of its genesis, definition methods, typology, features, factors affecting its success and risk. However, they did not reach for a systematic review of the literature. Mochkabadi and Volkmann (2018), as part of a systematic review of the literature, analyzed the genesis, research perspectives, and equity crowdfunding motives. Recent literature reviews focus on specific types of crowdfunding, in particular: reward-based crowdfunding (Guan 2016), crowd lending, crowd equity, crowd patronage, and crowd charity (Gleasure and Feller 2016), Venture Capital, Angel Financing, and Crowdfunding of Entrepreneurial Ventures (Wallmeroth et al. 2018). In contrast, Rusdin et al. (2017) focus on types of crowdfunding models, pros and cons of crowdfunding for research domains, and assessment of crowdfunding platforms in the context of academic grants. Others run literature reviews through the use of integrative analysis (for example Pereira et al. 2015). They were looking for an answer to the following questions: how these platforms operate in their business ecosystem and what are their strategies to overcome its competition and challenges. The use of an integrative approach can be seen as a serious problem and a scarcity, because only systematic reviews allow for obtaining a summary of existing evidence-based knowledge and determining the future direction of research

(Greenhalgh et al. 2004). In turn, Stiver et al. (2015), based on the strategy of "going backward" analyzed journal articles and conference proceedings in terms of number of fields involved in civic crowdfunding research and home in on dominant themes, debates, platforms, and projects. There are significant shortcomings of the previous systematic reviews of crowdfunding literature, they did not relate strictly to the public sector and were not comprehensive. Our research is able to identify areas where significant progress has been made and identify those around which future research should be conducted. In addition, despite the fact that systematic literature reviews are becoming increasingly popular in public sector research (e.g., Tummers et al. 2015), there is still a lack of a comprehensive systematic review of crowdfunding in the public sector.

Thirdly, given the current literature reviews, it is difficult to clearly indicate the state of the art on crowdfunding in the public sector. It can be seen that studies in this area are of a general nature and they ignore the aspect of content, course, crowdfunding result, as well as antecedents and outcomes. This article is embedded in an open debate on crowdfunding in particular in the context of the public sector (Lee et al. 2016) and responds to the challenges of the need for further research on crowdfunding in the public sector, which "require long-term consideration" (Stiver et al. 2015). It is acknowledged that crowdfunding acts as a financial intermediary to support government-stimulated projects (Hollow 2013), but it is postulated that any crowdsourcing based concepts should be managed (Blohm et al. 2018), in particular we are taking here about adjusting the organizational context. However, no considerations were also made about crowdfunding.

Considering the above, there is an objective need to carry out a systematic review of crowdfunding literature in the public sector and to look at the goals and effects of crowdfunding. Considering the above gaps and limitations of previous literature reviews, this article will focus on identifying existing arrangements in the field of definition, operationalization, typology, goals, antecedents and outcomes of crowdfunding in the public sector. This article is in line with other reviews in the field of social sciences such as those made by Moritz and Block (2016) and complements the findings of Kaartemo (2017). It is part of the guidelines for updating previous reviews (PRISMA) (Moher et al. 2009).

We answer these questions by means of a literature review where we investigate how the crowdfunding in the public sector is conceptualized with an aim to come up with a framework. This article has the following structure: the first section describes the methodology of systematic literature review used in the article. Then, "Preferred Reporting Items for Systematic Reviews and Meta-Analyzes" (PRISMA), consistent with the approach (Moher et al. 2009), was discussed. Then the results of a systematic review of the literature were presented and the research questions were answered. Based on these results, then in the last part, conclusions were drawn, limitations were pointed out, and a program for future crowdfunding research in the public sector was developed.

2.2 Research Method

This research article follows a thorough review process following the method suggested by Webster and Watson (2002). According to Webster and Watson (2002), a literature review on a specific topic is worthwhile if there is a growing interest and accumulation of research on that topic. Two strategies were used to identify eligible articles. Firstly, we searched in two international databases, Web of Science and Scopus. These databases provide quick access to reviewed articles and search functions that enable the identification of papers on crowdfunding in the public sector.

According to the indications of Macht and Weatherston (2015), articles should contain the words [crowdfund OR crowd-fund OR crowd fund OR crowdfunding OR crowdfunding OR crowd funding OR crowdfunders OR crowd-funders OR crowd funders] in their title and/or abstract in order to prevent confusion with related concepts. In the first search period, it was not necessary for the word 'public' to appear in the title or abstract because some research is carried out in the area of a particular public policy (such as education) without the term 'public'. This strategy resulted in 2910 publications.

Secondly, to level out potential restrictions caused by the literature search criterion, we also included the journals: Public Management Review, Public Performance and Management, Public Administration, Public Administration Review, International Journal of Public Sector Management, Journal of Public Administration Research and Theory, Public Money and Management, International Public Management Journal, Governance, Policy Sciences, Policy & Internet, Canadian Public Administration, International Review of Administrative Sciences and Chinese Public Administration Review. These journals were chosen since they are the best journals on public administration as a part of "SCIMAGO Journal Rank". As a part of their search the same criteria as in the first strategy were used. This resulted jointly in 14 articles.

In the documentation of the process of searching for relevant literature, the principles of writing PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols) in accordance with the guidelines of Moher et al. (2009) were used. We assumed that the articles included in the literature review should meet the following five criteria: (1) Field—articles should explore crowdfunding in the public sector. We define the public sector after OECD (2008): "The public sector comprises the general government sector plus all public corporations including the central bank": (2) Topic—the included research concerned crowdfunding in the public sector; (3) Study design—only empiric, full-text studies (e.g., questionnaire, case study, experiment) were included in the analysis because we are interested in empirical evidence on public sector crowdfunding. Research was the basis, therefore case studies with an illustrative character were excluded. Previous systematic literature reviews were also excluded to avoid duplication of considerations; (4) Language—the search was narrowed down to English-language publications, which may increase the transparency of

the findings (Kaartemo 2017). Therefore, publications in Spanish, French, Russian, Chinese, and Italian were omitted; (5) Year of publication—articles that were published between August 2011 (the first reviewed article was published in 2011, Ordanini et al. 2011) and July 19, 2019 (search dates) were searched for. Searching through ISI Web of Science and Scopus databases provided a total of 2610 studies. Then we applied the eligibility criteria. Based on them, we included 64 studies in our analysis. Our selection process is presented in the PRISMA flow chart (Fig. 2.1).

In the first stage, we scanned abstracts and titles in the Web of Science and Scopus databases. In this way, we generated 2910 publications. Then we included a list of public administration journals in our search. As a result, we generated 14 publications. Then we included the inclusion criteria (e.g., subject, language, dates). We checked whether they included all assumed criteria. We further removed publications in other languages and duplicates. Subsequently, the titles and abstracts of the articles that had undergone the initial selection process were read. If more information was needed, the full texts were read. This allowed us to narrow the publication base to those that directly focus on crowdfunding research in the public sector. That way we obtained 64 publications for our analysis.

The articles were then coded based on the principles of suitability and feasibility (Webster and Watson 2002). The codes were predetermined. We prepared a data extraction form for each publication, containing the following data: author/authors, publication year, title, journals, methods used, definition used, crowdfunding types applied, antecedents in the crowdfunding and outcomes. In addition, each article was classified according to the following four categories: (1) Review or Survey, which presents a review or survey related to crowdfunding in public sector as its main content; (2) Discussion, which presents a discussion of challenges, issues or trends within crowdfunding in public sector as its main content without a comprehensive solution; (3) Theoretical Solution, which identifies crowdfunding in public sector research problems and proposes some conceptual or theoretical solutions; (4) Practical Solution, besides the conceptual or theoretical solutions, a possibility appears for the practical implementation of crowdfunding in the public sector.

2.3 Results

The synthesized results of all articles identified for the systematic review of literature show an increase in the number of publications since 2014. The number of publications has increased rapidly in recent years: over 78% of all publications were selected for research in 2016–2019. Others were published in the years 2011–2015 (Fig. 2.2).

Many studies were conducted in the United States (28.12%) and the United Kingdom (10.94%). This suggests that the American-Anglo-Saxon perspective is crucial in crowdfunding research in the public sector. It may be due to institutional, formal and legal as well as cultural burdens, and therefore frequent use of crowdfunding initiatives by public sector organizations in the United States and

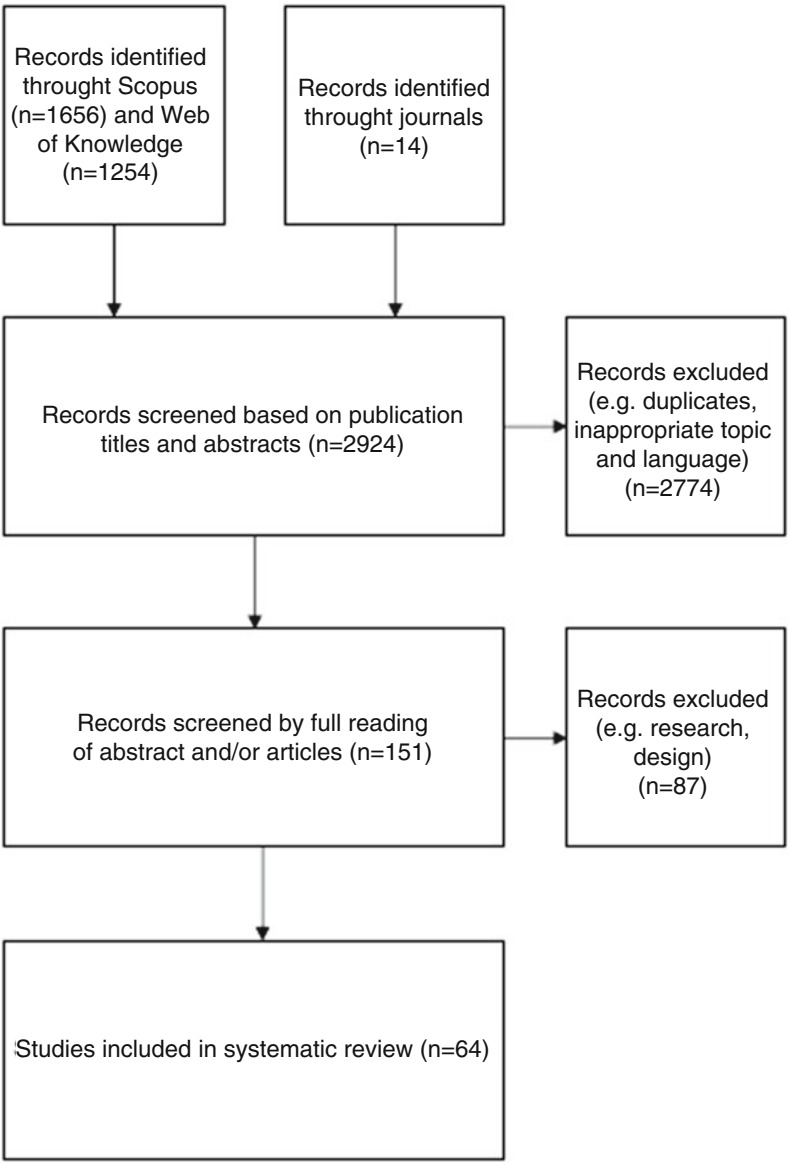

Fig. 2.1 PRISMA flow diagram for literature review process

the United Kingdom. In addition, the vast majority of the analyzed studies (63; 98.44%) were conducted in one country, which indicates no comparisons between countries.

The articles included in the systematic review were published in 57 different magazines. Several have been published in Policy & Internet (8), Public

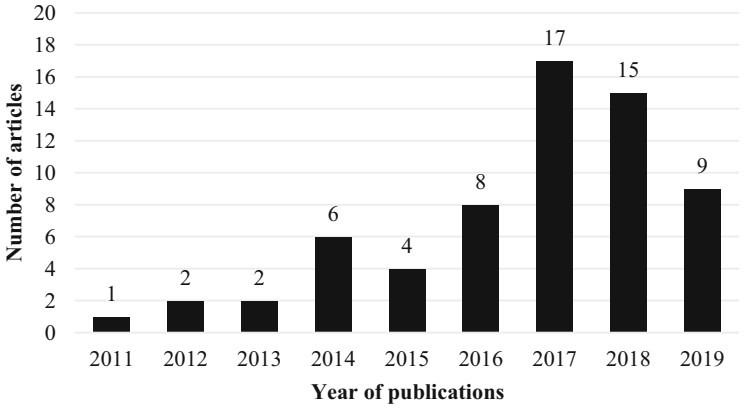

Fig. 2.2 Year of publication for articles included in the systematic review

Administration Review (2), Public Money and Management (2) and the Canadian Public Administration (1). In addition to these public administration journals, articles can also be found in other dedicated journals such as: Sustainability (1), International Journal of Cultural Policy (1), European Political Science Review (1), Journal of Heritage Tourism (1), Research Policy (1), Journal of Urban and Regional Analysis (1), Journal of Institutional Economics (1), Journal of Civil Society (1), and Public Relations Review (1).

The largest group of crowdfunding research in the public sector was conducted at the level of cultural institutions, in particular museums and libraries (12; 18.75%). A slightly smaller, but also a significant group of studies relates to local government (11; 17.19%), followed by government (8; 12.50%), with many of them being implemented in the United States (e.g., Goodspeed 2019). This may be due to the fact that the majority of crowdfunding projects dedicated to state administration are being implemented in the United States. Several studies have been conducted on crowdfunding in the healthcare sector (3), higher education (3) and education (2). Some studies referred to the public sector, but the authors did not identify any subsectors (e.g., Xu and Ge 2017).

The vast majority of the research studies analyzed were qualitative (56 publications; 87.5%), adopting mainly the approach based on a single (52; 81.25%) and multiple-stage case (4; 6.25%). A small group of studies was based on quantitative data (5; 7.81%). Individual studies were quantitative and qualitative (Marchegiani 2017; Colasanti et al. 2018). Thus, in the analyzed publications qualitative studies dominate.

2.3.1 Definitions

It should be pointed out that there is a clear problem in defining crowdfunding in the public sector. Over 40% of the analyzed works do not contain the definition of crowdfunding. When crowdfunding is defined, researchers do not propose their own definitions, but refer to the existing ones (30; 46.85%). Most definitions were based on Ordanini et al. (2011) who define crowdfunding as "a collective effort by people who network and pool their money together, usually via the Internet, in order to invest in and support efforts initiated by other people or organizations". Other researchers consider crowdfunding as "an act of acquiring third-party financing from the general public via an intermediary, generally in the form of a web-based platform" (Tomczak and Brem 2013). Few researchers consider crowdfunding as an example of process and management innovation because it offers a new process, as well as a new form of management to solve social problems, (Hong and Ryu 2018). Brabham, in turn, recognizes crowdfunding as "the process of appealing to and leveraging the resources of the crowd to better achieve a particular goal or project" (Brabham 2013).

2.3.2 Types

Based on the systematic review of crowdfunding literature, we identified four types of crowdfunding (13; 20.31%), such as: donation-based, reward-based, lending-based, and equity-based. They are the same as those highlighted in the public sector, with crowdfunding focused on raising funds for research (e.g., Bassani et al. 2019; Sauermann et al. 2019). Few researchers, when discussing crowdfunding in the public sector point to civic crowdfunding (9; 14.06%), which they regard as "sub-type of crowdfunding through which citizens, in collaboration with government, fund projects providing a community service" (Stiver et al. 2015). Civic crowdfunding refers to direct civic funding or community projects initiated by local, federal or national governments (Davies 2015; Hollow 2013; Lehner 2013). Some crowdsourcing studies were not distinguished by type, but the authors did not identify any subsectors (e.g., Đurđenić 2017). A summary of crowdfunding types along with their frequency is given in Table 2.1.

Table 2.1 Public sector crowdfunding types

Crowdfunding type	N
Reward-based	40 (62.5%)
Donation-based	8 (12.5%)
Lending-based	7 (10.94%)
Equity-based	6 (9.37%)
Civic crowdfunding	3 (4.69%)

Total N = 64 (100%)

By far the most commonly used type of crowdfunding by the public sector is reward-based crowdfunding (62.5% of all identified studies). The above findings are in line with Mollick (2014), who believes that reward crowdfunding is currently the most common form of crowdfunding. For example, Renwick and Mossialos (2017) presented the typology of crowdfunding health projects and reviewed the main economic benefits and risks connected with crowdfunding in the health market. Next, donation-based crowdfunding comes down to citizen-led civic response that follows natural disasters or announcing charity actions. Often this model is used for social causes, charities, and political campaigns. For example, Moqri and Bandyopadhyay (2017) analyzed the relationship between the number of contributions and donation-based crowdfunding based on 590 crowdfunding projects. In the literature, less attention is paid to lending model crowdfunding, where the financing party is the lender who expects the return of capital with interest (Baeck et al. 2014). This model offers the possibility of directly borrowing funds from the online community, bypassing banks, parabanks or other intermediaries in raising money. Finally, examples of equity crowdfunding can be found in the paper by Wang and Shulruf (2012), where it is considered to be the future for higher education. In relation to civic crowdfunding, crowdfunding can play its role as a financial intermediary to support government-incentivized multinational project in the context of the One-Belt, One-Road initiative (Lee et al. 2016), which was studied and focused on understanding the role of lead donor types in civic crowdfunding (Hassna et al. 2018). Others tested the possibility of using crowdfunding to finance public media (Bonini and Pais 2017). In conclusion, it can be said that literature seems to be inclining towards donation-based crowdfunding based on donating non-financial awards to donors. This suggests that there has been no in-depth research on other types of crowdfunding.

2.3.3 Goals

Table 2.2 shows, based on the analyzed studies, the objectives of crowdfunding in the public sector.

In the context of the benefits of crowdfunding in the public sector, most publications do not mention any goal at all (30; 12.55%). One reason for this is that the research focused on the success factors of the crowdfunding initiative in the public sector (25; 39.06%) (e.g., Lau and Chew 2016). In the analyzed publications, goals are presented in two categories, such as: (1) goals of funders (e.g., Cecere et al. 2017) and (2) goals of founders (e.g., Light and Briggs 2017). The most frequently mentioned motivations for crowdfunding in the analyzed literature in the public sector were the improvement of results, expressed in terms of effectiveness and efficiency (44 times) (e.g., Hollow 2013). Crowdfunding in the public sector is seen through the lens of increased citizen involvement (30 times). Some studies relate to the benefits of increasing market share and overcoming institutional barriers—in particular, this applies to healthcare in the United States (e.g., Berliner and

Table 2.2 Public sector crowdfunding goals

Crowdfunding goal	N
Goals not included	30 (12.55%)
Goals of funders	
Access to a completed local project	45 (18.83%)
Awards	19 (7.95%)
Goals of founders	
Effectiveness and efficiency	44 (18.42%)
Involving citizens in solving social problems	30 (12.55%)
Insight into citizen's preferences	20 (8.37%)
Increasing market share	20 (8.37%)
Breaking institutional barriers	15 (6.28%)
Gaining trust and legitimization	10 (4.18%)
Levelling social inequalities	3 (1.25%)
Access to sources of financing	3 (1.25%)

Total N = 239 (100%) – some studies included more than one goal

Kenworthy 2017; Burtch and Chan 2018) and the United Kingdom (e.g., Baeck et al. 2014). This means that crowdfunding in the public sector focuses not only on efficiency, but also on gaining trust and legitimization (10 responses) and equalizing social inequalities (3 responses) and gaining access to sources of research funding (2 responses).

2.3.4 Antecedents and Outcomes

Literature on crowdfunding in the public sector has devoted most of its attention to identifying the factors that determine the success of crowdfunding campaigns. Only a few researchers try to answer the question: what factors determine the launch of the initiative by the public sector? (e.g., Mollick 2014). It should be highlighted that in the analyzed publications researchers did not define the concept of antecedence and did not indicate which of the types of antecedence are the most important for undertaking crowdfunding initiative. Some understand anti-mediation as requirements for crowdfunding platforms (e.g., Zheng et al. 2014; Zhou et al. 2018), others as barriers (e.g., Phillips 2017). The publications analyzed in the direction of crowdfunding in the public sector allow aggregation of the identified types of antecedence into the following four generic groups, such as: (1) environmental (e.g., government involvement, transparency); (2) intra-organizational (e.g., organizational culture, organizational structure); (3) crowdfunding attributes (e.g., typology, target capital, rewards, time and resource commitment); (4) behavioral (e.g., leadership, empowerment). An overview of environmental antecedents is provided in Table 2.3.

Table 2.3 Environmental antecedents

Antecedent	N
Environment pressure	45 (38.46%)
Legal regulations	40 (34.19%)
Government involvement	32 (27.35%)

Total N = 117 (100%) – some studies included more than one antecedent

Firstly, the category of environmental-related antecedents relates to the context in which public sector organizations operate. It is emphasized in the literature that crowdfunding is regulated in some countries, including the United States, the United Kingdom, Germany, and Italy (Đurđenić 2017). Without the government's involvement, support, and pursuit of transparency, the virtual community would be less interested in participating in crowdfunding (Hong and Ryu 2018). Hong and Ryu (2018) state that government involvement increases trust between creators and funders. In addition, the government's involvement "provides some type of accreditation or certification (...) mitigating the information asymmetry problem". By identifying the environmental antecedents, we see that the most frequently mentioned are such as: environment pressure (including citizens' expectations). This means that changes occurring in the environment within the organization forces organizations to be more adaptive, which translates into the search for new ways of functioning (Borins 2000). In addition, commitment, trust and willingness to interact with the local community are often noted. Aspects related to legal regulations were also noted. It is generally considered that legislation impedes crowdfunding in the public sector. For example, Phillips (2017) mentions the lack of regulations governing crowdfunding initiatives as a key factor impeding crowdfunding. Hong and Kim (2018) believe that the government provides accreditation that aims to achieve social goals. Whereas Gabison (2015) considers excess provisions to be harmful to crowdfunding.

Secondly, it is difficult to point out publications strictly regarding intra-organizational factors favoring crowdfunding in the public sector. As Bryson et al. (2006) point out, designing significant public participation processes is a challenge for local government administrators. In turn, Boyne and Walker (2010) believe that "Organizations have to find appropriate relationships between the 'entrepreneurial' problem (which strategy to adopt), the 'engineering' problem (which technologies to use), and the 'administrative' problem (which processes and structures to select)". In addition, designing structures promote accountability, while minimizing concerns of equity and representation is of key importance (Demediuk et al. 2012). On top of that, it is important to determine the resources and whether crowdfunding will be an opportunity or a threat for a public organization (Davies 2015). As stated by Irvin and Stansbury (2004) "incorporating citizen input into agency decision making is not a costless process". Table 2.4 lists identified antecedents regarding intra-organizational conditions.

Thirdly, researchers most often rely on publications concerning the antecedents of crowdfunding project success, in particular by Hou et al. (2015) and Mollick (2014).

Table 2.4 Organizational antecedents

Antecedent	N
Leaders' involvement	30 (46.87%)
Resources at hand	15 (23.44%)
Inclination to risk	9 (14.06%)
Climate for learning	8 (12.50%)
Organizational structure	1 (1.56%)
Organizational culture	1 (1.56%)

Total N = 64 (100%)

Table 2.5 Crowdfunding characteristic

Antecedent	N
Project promotion	25 (21.19%)
Project goal	23 (19.49%)
Duration	20 (16.94%)
Creators' presence in the social media	15 (12.71%)
Benefits for the donators	15 (12.71%)
Project presentation	10 (8.47%)
Crowdfunding platform's look	10 (8.47%)

Total N = 118 (100%) – some studies included more than one antecedent

Table 2.6 Behavioral antecedents

Antecedent	N
Orientation on innovation	5 (33.33%)
Organizational position	4 (26.67%)
Knowledge and skills	3 (20%)
Demographic aspects	1 (6.67%)
Involvement	1 (6.67%)
Risk acceptance	1 (6.67%)

Total N = 15 (100%)

Attention is paid to the important features of the crowdfunding projects in question and their connection with the results of projects, in particular: the purpose, duration, distinctive features of the project, its presentation, the presence of project creators in social media, benefits for donors, project promotion, level of project credibility, and appearance crowdfunding platform. A list of identified crowdfunding features is provided in Table 2.5.

In relation to the previous antecedents, internal factors determining crowdfunding in the public sector are most often mentioned and considered as the most important. The most frequently mentioned features of crowdfunding are the promotion of the crowdfunding platform (e.g., Goodspeed 2019) and the goal and duration (Hou et al. 2015). Mitra and Gilbert (2014) show that individual words and phrases used in a given crowdfunding campaign allow to predict its results. Fourthly, Table 2.6 lists the identified crowdfunding behavioral antecedents in the public sector.

Due to the fact that crowdfunding changes the traditional meaning of the interaction between the citizen and civil servant, attention is paid to their attitude of civil

Table 2.7 Crowdfunding outcomes

Outcomes	N
No outcomes mentioned	50 (78.12%)
Mitigating information asymmetry problem	5 (7.81)
Improving citizen trust	3 (4.69%)
Solving social problems	2 (3.12%)
Democratizing financing	1 (1.56%)
Carry forward politically	1 (1.56%)
Contentious public services	1 (1.56%)
Achieving a public mission	1 (1.56%)

Total N = 64 (100%)

servants and their orientation towards innovation. The position taken is also important, because leaders are expected to be open and create a framework for crowdfunding. On top of that, we note that work-related skills are also valued. It should be noted that in most of the analyzed publications, researchers did not mention any outcomes (50; 78.12%). Some respondents pay attention to gaining access to financing, shaping social norms in various contexts (Koçer 2015; Stiver et al. 2015), innovation (Chan and Parhankangas 2017), and social capital (Butticè et al. 2017; Skirnevskiy et al. 2017). Others point out that crowdfunding can be a participatory culture or as civic participation (Stiver et al. 2015). The identified crowdfunding outcomes are presented in the Table 2.7 below.

In addition, researchers report that crowdfunding "partially fills gap in medical care coverage for patients in need (...) This money may be used to accelerate clinical testing and development of a novel therapy, expand health service offerings, or scale-up production and operations for a medical product" (Renwick and Mossialos 2017). Many articles focused on the positive effects of crowdfunding, and only a few considered specific failures in crowdfunding (Davies 2015). Other studies synchronize the increase in citizen involvement and satisfaction. In turn, Renwick and Mossialos (2017), based on crowdfunding analyzes in the healthcare sector, state that "crowdfunding may be an inefficient method of health priority setting and allocation of financing because decisions may be determined by funder sentiment and swayed by behavioral economic principles such as signaling and herding". In general, in the case of crowdfunding in the public sector, the ability to channel citizen funds toward specific projects is not the most important thing. This may mean that crowdfunding is seen as for its capacity to partner project creators with municipalities, organizations, and individual citizens interested in online and offline contributions, alternative source of funding at a time of constrained government budgets, facilitating networking, and encouraging collaboration between citizens and government (Stiver et al. 2015)—which is reflected in the public sector crowdfunding goals and which have already been mentioned.

2.4 Discussion and Conclusion

The purpose of this article was to provide a systematic review of crowdfunding literature in the public sector. In this way, we tried to summarize the available empirical knowledge, while integrating research results. On top of that, we tried to propose a research program for the future, contributing to further institutionalization of crowdfunding in the public sector. We proposed a research path in the article to further deepen our knowledge of crowdfunding in the public sector. To gain a clear empirical understanding of crowdfunding literature in the public sector, we conducted a systematic literature review that addressed the following research questions: What definitions of crowdfunding in the public sector are used? What types of crowdfunding in the public sector can be distinguished? What are the goals of crowdfunding in the public sector? Which antecedents influence the public sector crowdfunding? What are the outcomes of the public sector crowdfunding? Figure 2.3 presents the synthesis of empirical results. This framework can provide a guide for

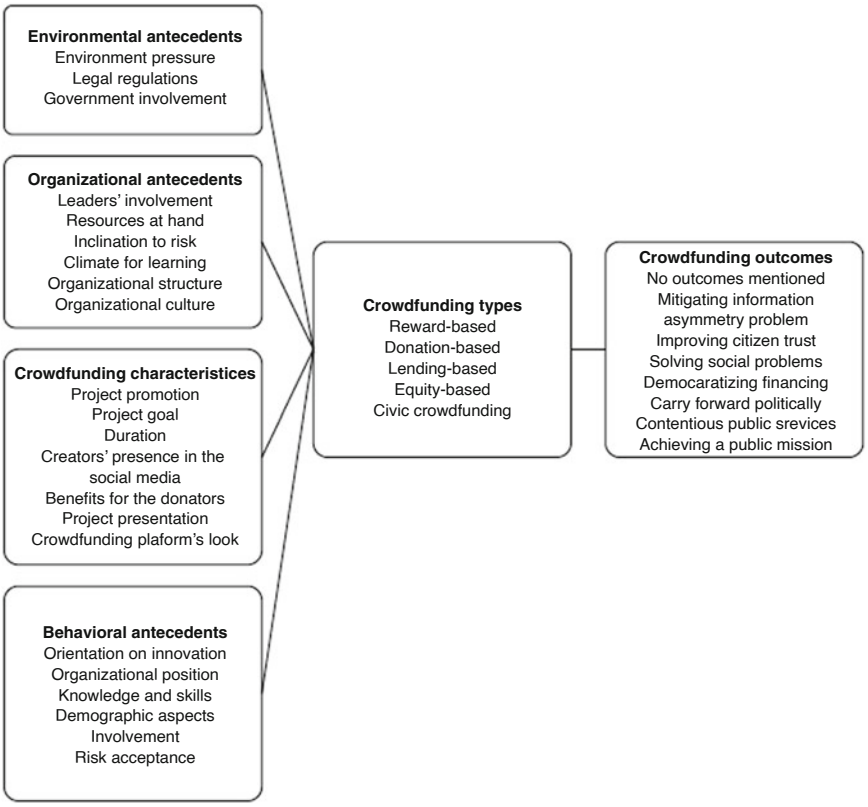

Fig. 2.3 Framework of public sector crowdfunding

future researchers. We found that little attention was given to the antecedents (Fig. 2.3).

Scientific research on crowdfunding in the public sector is still in its infancy. Quantitative studies are still rare. Qualitative methods, such as interviews, have been used in the vast majority of researched studies. In contrast, mixed method studies were less common. Several conclusions can be drawn from the systematic review of the literature. First of all, answering the research question posed in this article "what definitions of crowdfunding in the public sector are used", we found no clear theoretical basis in the works analyzed. The researchers do not propose their own definitions (with the exception of Brabham 2013), but they reach for the existing ones by Ordanini et al. (2011). Moreover, it is difficult to identify the most frequently quoted seminal studies. Our literature review shows that empirical research to date does not explain what crowdfunding in the public sector is, as researchers reach into general crowdfunding theories. Secondly, regarding the question about crowdfunding types in the public sector, researchers refer to the existing four types of crowdfunding, such as: donation-based, reward-based, lending-based, and equity-based. It is difficult to find a typology typical for crowdfunding in the public sector. Thirdly, we have found that crowdfunding goals in the public sector are analyzed broken down into goals of funders and goals of founders. Goals of founders were discussed more often, in particular improving efficiency, productivity, citizen involvement and trust, and legitimizing and leveling out social inequalities. Fourthly, literature presents antecedents to a very limited extent and does not identify those that are of key importance in the public sector. Few studies on antecedents indicate environmental (e.g., legal regulations, government involvement), intra-organizational (e.g., resources, leadership styles), attribute (e.g., purpose, duration, promotion of crowdfunding initiative) and behavioral (e.g., public organization employees' motivation, their creativity). In the empirical works analyzed, however, no analyses were found for connections and relationships between antecedents and crowdfunding in the public sector. Fifthly, identification of outcomes of the public sector crowdfunding has shown that attention is paid to gaining access to finance, shaping social norms, innovation, and social capital.

The current state of the art about crowdfunding in the public sector requires systematization and clarification in order to obtain greater transparency of the analyzed issues. Therefore, based on the current state of the art about crowdfunding in the public sector, we propose methodological, theoretical and empirical implications. An undoubted challenge for future researchers is to conduct research on crowdfunding in the public sector, including quantitative and quantitative-qualitative methods, which will reduce the weaknesses of each of them. We do not know the strength of crowdfunding or the antecedents' impact on crowdfunding, and it is possible thanks to the use of quantitative methods. It is also difficult to identify the importance of outcomes on crowdfunding. It is difficult to use qualitative methods such as interviews. Regarding the theoretical implications, we have not identified any studies that are related to the existing theory. Future considerations may focus on the links between crowdfunding research in the public sector and

existing theories, which can help in many ways. In particular, the following five theories are referred to:

(1) social networking theory based on social relations, group ties and social structures. This will allow an analysis of flows of reciprocity and trust in society; (2) signaling theory, which is based on information asymmetry theory, according to which the degree of hidden information between parties involved in a financial transaction results in disequilibrium. To reduce the problem of information asymmetry, as part of the signaling theory, if one of the parties transmits relevant information to others, it serves as a signal for financial transactions. Thus, the quality of the signal determines the success of the undertaking; (3) theory of institutions, which says that institutional efficiency is limited by opportunism and it creates room for financial innovation and increasing incentives for investment. Thus, a well-identified institutional framework promotes the flow of capital and the reduction of transaction costs of the venture; (4) stakeholder theory, which states the need to provide value to various social groups participating in the venture. This increases trust and capital mobilization in the future; (5) theory of disruptive innovation refers to a change in the way organizations work, which is important in the case of disruptive innovation, which crowdfunding is considered to be.

So far, research on crowdfunding in the public sector has been conducted mainly in the United States and the United Kingdom. Crowdfunding is developed in these countries and the results obtained are difficult to transfer to other countries. This does not allow crowdfunding to be understood in different cultural contexts. In addition, most of the research was conducted in culture-related organizations, which also makes generalization difficult. Therefore, we suggest conducting further research taking into account other countries and sectors. Therefore, future research could focus on the perception of crowdfunding in various public organizations, in particular higher education, where deficiencies are seen in the context of research. Findings regarding the antecedents is also insufficient. This is an important aspect, because antecedents have a direct and key impact on the launch of the crowdfunding initiative by the public sector.

The systematic literature review has made it possible to propose implications for public sector managers, which can increase awareness of the importance of crowdfunding for the public sector, and thus take a proactive approach to citizen participation. Crowdfunding can ensure reaching the crowd and getting help in financing projects initiated by the public sector. Leaders in the public sector should remember that crowdfunding can have a positive impact on public organizations since as it contributes to increasing efficiency and productivity as well as increasing the involvement of citizens in solving social problems. The public sector also has easier insight into citizens' preferences. The reason for its initiation is the increase in the requirements of citizens who are interested in reducing the boundaries between them and the administration. Legal regulations and broadly understood government involvement are not without significance. In addition, it is important to involve leaders of public organizations, who are responsible for creating conditions for the employees of the organization to be innovation-oriented and open to the voices of citizens. The willingness of citizens to play a role and involvement in the functioning

of public organizations depends on the leaders. Contemporary politics and the public sector are oriented at citizen participation. In the light of the results obtained, ensuring open lines of communication and dialogue between citizens and the public sector can significantly contribute to building and maintaining social capital. In addition, from the point of view of the effectiveness and efficiency of the public sector, encouraging citizens to participate in crowdfunding dedicated to a public organization should be combined with ensuring transparency and enabling citizens to finance projects that they believe to be important. Care for organizational fit, especially in terms of management and strategic orientation, will increase the chances of citizens' participation in crowdfunding and the involvement of employees of a public organization. And thus, it will contribute to openness, transparency and democratization of the public sector, which can solve social problems in accordance with the requirements and expectations of citizens and increase social capital.

2.5 Limitations

It should be emphasized that the obtained results of the systematic review of crowdfunding literature in the public sector are not final, universal, and free from limitations. The main limitation of this review is bias in the selection of the publications analyzed. The selection of publications was based on full text works available in the databases exclusively in English, which eliminated national literature and studies not available in the digital version. It was limited to reviewing publications in journals only, thus excluding monographs and conference materials. To counteract the negative effects of those limitations, a research report was developed in accordance with the pre-defined research questions. The process of literature inclusion and exclusion was also described in accordance with the PRISMA guidelines. The restriction may refer to the omission of theoretical studies. It was recognized that a focus on empirical research could provide the basis for formulating theoretical implications for future researchers. Despite these limitations, this article is a way to better understand the nature of crowdfunding in the public sector both for researchers and practitioners. The issue of crowdfunding in the public sector is still at an early stage and constitutes an attractive research problem, and its deeper recognition may be the subject of an exchange of scientific thought in the international field. Taking into account the novelty of this concept, it requires more research, including existing theories and socio-economic, financial, behavioral, and regulatory perspectives.

References

Austin JE, Seitanidi MM (2012) Collaborative value creation: a review of partnering between nonprofits and businesses: part I. Value creation Spectrum and collaboration stages. Nonprofit Volunt Sect Q 41(5):726–758

Bachmann A, Becker A, Buerckner D, Hilker M, Kock F, Lehmann M, Tiburtius P (2011) Online peer-to-peer lending—a literature review. J Internet Bank Commer 16(2):1–18

Baeck P, Collins L, Zhang B (2014) Understanding alternative finance—the UK alternative finance industry report 2014. Retrieved from www.nesta.org.uk

Barber BR (2003) Strong democracy: participatory politics for a new age. University of California Press, London

Bassani G, Marinelli N, Vismara S (2019) Crowdfunding in healthcare. J Technol Transfer 4 (44):1290–1310

Berliner LS, Kenworthy NJ (2017) Producing a worthy illness: personal crowdfunding amidst financial crisis. Soc Sci Med 187:233–242

Blohm I, Zogaj S, Bretschneider U, Leimeister JM (2018) How to manage crowdsourcing platforms effectively? Calif Manag Rev 60(2):122–149

Bonini T, Pais I (2017) Hacking public service media funding: a scenario for rethinking the license fee as a form of civic crowdfunding. Int J Media Manag 19(2):123–143

Borins S (2000) What border? Public management innovation in the US and Canada. J Policy Anal Manage 19(1):46–74

Boyne GA, Walker R (2010) Strategic management and public service performance: the way ahead. Public Adm Rev 70(s1):185–192

Brabham DC (2013) Crowdsourcing. MIT Press, Cambridge, MA

Bryson JM, Crosby BC, Stone MM (2006) The design and implementation of cross-sector collaborations: propositions from the literature. Public Adm Rev 66(s1):44–55

Burtch G, Chan J (2018) Investigating the relationship between medical crowdfunding and personal bankruptcy in the United States: evidence of a digital divide. MIS Q 43(1):237–262

Butticè V, Colombo MG, Wright M (2017) Serial crowdfunding, social capital, and project success. Entrep Theory Pract 41:183–207

Cecere G, Le Guel F, Rochelandet F (2017) Crowdfunding and social influence: an empirical investigation. Appl Econ 49(57):1–12

Chan CSR, Parhankangas A (2017) Crowdfunding innovative ideas: how incremental and radical innovativeness influence funding outcomes. Entrep Theory Pract 41(2):237–263

Colasanti N, Frondizi R, Meneguzzo M (2018) Higher education and stakeholders' donations: successful civic crowdfunding in an Italian university. Public Money Manag 38(4):281–288

Davies R (2015) Three provocations for civic crowdfunding. Inf Commun Soc 18(3):342–355

De Vries H, Bekkers V, Tummers L (2016) Innovation in the public sector: a systematic review and future research agenda. Public Adm 94(1):146–166

Demediuk P, Solli R, Adolfsson P (2012) People plan their park: voice and choice through participatory budgeting. Int J Interdiscip Soc Sci 6(5):185–198

Đurđenić K (2017) Crowdfunding – Croatian legal perspective and comparison to other sources of financing. Public Sector Econ 41(2):259–287

Feller J, Gleasure R, Treacy S (2013) From the wisdom to the wealth of crowds: a metatriangulation of crowdfunding research. TOTO working paper. Available at http://opennessandtransparency.net/sites/default/files/TOTO-Working-Paper-2013.01-v2.pdf

Fuchs D (2006) Participatory, liberal and electronic democracy. In: Zittel T, Fuchs D (eds) Participatory democracy and political participation: can participatory engineering bring citizens back in? Routledge, New York, pp 29–53

Gabison GA (2015) Understanding crowdfunding and its regulations, Scientific and Policy Reports, European Commission

Ghezzi A, Gabelloni D, Martini A, Natalicchio A (2017) Crowdsourcing: a review and suggestions for future research. Int J Manag Rev 20(2):343–363

Gleasure R, Feller J (2016) Does heart or head rule donor behaviors in charitable crowdfunding markets? Int J Electron Commer 20(4):499–524
Goodspeed R (2019) Participatory E-planning with civic crowdfunding: donor background, involvement, and social capital outcomes. Int J E-Plann Res 8(2):20
Greenhalgh T, Robert G, Macfarlane F, Bate P, Kyriakidou O (2004) Diffusion of innovations in service organizations: systematic literature review and recommendations for future research. Millbank Q 82:581–629
Guan L (2016) A Short literature review on reward-based crowdfunding. In: Yang B (ed) Service systems and service management, 13th international conference on. Kunming, China, 1–4
Harrison TM, Guerrero S, Burke GB, Cook M, Cresswell A, Helbig N, Pardo T (2012) Open government and e-government: democratic challenges from a public value perspective. Inf Polity 17(2):83–97
Hassna G, Burtch G, Lee CH, Zhao JL (2018) Understanding the role of lead donor types in civic crowdfunding. Available at SSRN https://ssrn.com/abstract=3175916 or https://doi.org/10.2139/ssrn.3175916
Hollow M (2013) Crowdfunding and civic society in Europe: a profitable partnership? Open Citizenship 4(1):68–73
Hong S, Kim TK (2018) Public–private partnership meets corporate social responsibility— the case of H-JUMP school. Public Money Manag 38(4):297–304
Hong S, Ryu J (2018) The role of government in crowdfunding for achieving co-funding of public projects. In: Proceedings of the 19th annual international conference on digital government research: governance in the data age, p 51
Hou J, Wang N, Ge S (2015) Antecedents of crowdfunding project success: an empirical study, WHICEB Proceedings, 52
Irvin RA, Stansbury J (2004) Citizen participation in decision making: is it worth the effort? Public Adm Rev 64(1):55–65
Kaartemo V (2017) The elements of a successful crowdfunding campaign: a systematic literature review of crowdfunding performance. Int Rev Entrep 15(3):291–318
Karaosman H, Morales-Alonso G, Brun A, Rosen MA (2017) From a systematic literature review to a classification framework: sustainability integration in fashion operations. Sustainability 9:30
Koçer S (2015) Social business in online financing: crowdfunding narratives of independent documentary producers in Turkey. New Media Soc 17(2):231–248
Lau KL, Chew BC (2016) Crowdfunding for research: a case study in research management centre in Malaysia. Int J Ind Eng Manag 7(3):117–124
Lee CH, Zhao JL, Hassna G (2016) Government incentivized crowdfunding for one-belt, one-road enterprises: design and research issues. Financial Innov 2(1):1–14
Lehner OM (2013) Crowdfunding social ventures: a model and research agenda. Ventur Cap 15 (4):289–311
Leonard A (2013) When batman isn't available: crowd-fund. Salon Magazine. Available at http://www.salon.com/2013/10/11/when_batman_isnt_available_crowd_fund/
Light A, Briggs J (2017) Crowdfunding Platforms and the Design of Paying Publics. CHI 2017. Association for Computing Machinery, New York, pp 797–809
London Councils (2013) Crowd funding and civic projects. Available at http://www.londoncouncils.gov.uk/capitalambition/ventures/crowdfunding.htm
Macht S, Weatherston J (2015) The benefits of online crowdfunding for fund-seeking business ventures. Strateg Chang 23(1–2):1–14
Marchegiani L (2017) From Mecenatism to crowdfunding: engagement and identification in cultural-creative projects. J Herit Tour 13(10):1–9
Massolution (2013) 2013 CF crowdfunding industry reports. Available at http://research.crowdsourcing.org/2013cf-crowdfunding-industry-report
Mayer M (2016) Crowdfunding and social policy. The global encyclopedia of public administration. Springer, New York

Miglietta A, Parisi E, Pessione M, Servato F (2014) Crowd funding and local governments: 35 a financial opportunity for a new liaison with citizens. In: Proceedings of the Toulon-Verona Conference Excellence in Services

Mitra T, Gilbert E (2014) The language that gets people to give: phrases that predict success on Kickstarter. In: Proceedings of the 17th ACM conference on Computer Supported Cooperative Work & Social Computing, pp 49–61

Mochkabadi K, Volkmann CK (2018) Equity crowdfunding: a systematic review of the literature. Small Bus Econ 2018:1–44

Moher D, Liberat A, Tetzlaff J, Altman DG (2009) Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. Ann Intern Med 151:264–269

Mollick E (2014) The dynamics of crowdfunding: an exploratory study. J Bus Ventur 29(1):1–16

Moqri M, Bandyopadhyay S (2017) Please share! Online word of mouth and charitable crowdfunding. In: Fan M, Heikkilä J, Li H, Shaw MJ, Zhang H (eds) Internetworked world. Springer, New York, pp 162–169

Moritz A, Block JH (2016) Crowdfunding: a literature review and research directions. In: Brüntje D, Gajda O (eds) Crowdfunding in Europe: state of the art in theory and practice. Springer, Cham, pp 25–53

Noveck BS (2009) Wiki government: how technology can make government better, democracy stronger, and citizens more powerful. Brookings Institution Press, Washington, DC

OECD (2008) Annual report, https://www.oecd.org/newsroom/40556222.pdf

Ordanini A, Miceli L, Pizzetti M, Parasuraman A (2011) Crowdfunding: transforming customers into investors through innovative service platforms. J Serv Manag 22(4):443–470

Pereira V, Nogueira R, Mazzon J, Chimenti P, Rodrigues M (2015) Crowdfunding: an integrative analysis. In: Proceedings International Marketing Trends Conference

Phillips R (2017) Success factors and barriers for crowdfunding campaigns for arts-based projects in the UK. IUP J Entrep Dev 3:45–65

Pichler F, Tezza I (2016) Crowdfunding as a new phenomenon: origins, features and literature review. In: Crowdfunding for SMEs. Palgrave Macmillan, London, pp 5–43

Renwick M, Mossialos E (2017) Crowdfunding our health: economic risks and benefits. Soc Sci Med 191:48–56

Rusdin MF, Ghazali M, Razak SA (2017) Online crowdfunding as academic Grants: a systematic literature review. J Telecommun Electron Comput Eng 9(3–4):187–193

Sauermann H, Franzoni C, Shafi K (2019) Crowdfunding scientific research: descriptive insights and correlates of funding success. PLoS One 14(1):e0208384

Short JC, Ketchen DJ, McKenny AF, Allison TH, Ireland RD (2017) Research on crowdfunding: reviewing the (very recent) past and celebrating the present. Entrep Theory Pract 41(2):149–160

Skirnevskiy V, Bendig D, Brettel M (2017) The influence of internal social capital on serial creators' success in crowdfunding. Entrep Theory Pract 41(2):209–236

Stiver A, Barroca L, Minocha S, Richards M, Roberts D (2015) Civic crowdfunding research: challenges, opportunities, and future agenda. New Media Soc 17(2):249–271

Tomczak A, Brem A (2013) A conceptualized investment model of crowdfunding. Venture Capital 15(4):335–359

Tummers LG, Bekkers VJJM, Vink E, Musheno M (2015) Coping during public service delivery: a conceptualization and systematic review of the literature. J Public Adm Res Theory 25 (4):1099–1126

Wallmeroth J, Wirtz P, Groh AP (2018) Venture capital, angel financing, and crowdfunding of entrepreneurial ventures: a literature review. Found Trends Entrep 14(1):1–129

Wang GY, Shulruf B (2012) Admission model and equity in higher education. Asia Pac Educ Res 22(1):111–117

Webster J, Watson R (2002) Analyzing the past to prepare for the future: writing a literature review. MIS Q 26(2):13–22

Xu D, Ge M (2017) Equity-based crowdfunding in China: beginning with the first crowdfunding financing case. Asian J Law Soc 4(1):81–107

Zheng H, Wan N, Chen D, Wang T (2014) Antecedents of project implementation success in crowdfunding. PACIS 2014 Proceedings, p 318

Zhou M, Lu B, Fan W, Wang A (2018) Project description and crowdfunding success: an exploratory study of national culture. Inf Syst Front 20(2):259–274

Chapter 3
Preparation to Execution: Orchestrating Campaign Processes in Organization-Led Crowdfunding

M. Isabella Cavalcanti Junqueira

Abstract This chapter examines the preparation and execution of crowdfunding campaigns as processes that can transform cross-functional organizational teams' collaborative approaches. The study of these processes in such campaigns remains underdeveloped; therefore, this study investigated the preparation and execution processes as organizational actors assemble to crowdfund. Drawing on a trust perspective, the investigation focused on two museum organizational teams' performances. The findings illustrate the strategies cross-functional teams employ to create a trusting environment involving multiple stakeholders. In the case studies, an early state of uncertainty preceded stakeholders' induction during the project initiation. This phase included a process of knowledge-sharing and trust development, with parties moving towards preliminary agreements. The findings demonstrate that as knowledge and competence are consolidated, synchronized team efforts reinforced the initial agreements through underexplored social-relational synergies. The process also requires the management of internal stakeholders' diverse ideologies, competencies, and expectations in this context. These findings provide an understanding of the dimensions underpinning adaptation and integration synergies towards a holistic organizational adoption of innovative funding methods. Further insights highlight the significance of knowledge exchange and communication across diverse departments and stakeholders throughout the preparation and execution of crowdfunding campaigns.

Keywords Crowdfunding · Organizations · Knowledge · Innovation · Trust · Stakeholders

M. Isabella Cavalcanti Junqueira (✉)
The School of Business, LeTourneau University, Longview, TX, USA

Department of Entrepreneurship and Strategy, Lancaster University Management School, Lancaster, UK
e-mail: isabella.junqueira@montreat.edu

R. Lenart-Gansiniec, J. Chen (eds.), *Crowdfunding in the Public Sector*,
Contributions to Finance and Accounting,
https://doi.org/10.1007/978-3-030-77841-5_3

Abbreviations

RBCF Reward-based crowdfunding

3.1 Introduction

This chapter explores the preparation and execution of crowdfunding campaigns as processes that can transform cross-functional organizational teams' practices when adopting innovative funding methods. This endeavor is valuable for several reasons.

First, the reward-based crowdfunding (RBCF) literature has generally recognized the preparedness of creators (both individuals and organizations) as an important factor influencing the success of an RBCF campaign (Agrawal et al. 2013; Belleflamme et al. 2014; Mollick 2014). Within the broad concept of preparedness, specific competence markers and campaign components have been identified as being capable of influencing campaign success, including creators' mobilization of supporters through high-quality videos, the provision of suitable rewards, and persuasive entrepreneurial storytelling (Anglin et al. 2018; Cholakova and Clarysse 2015; Manning and Bejarano 2017).

Many studies have focused on the factors mentioned above and their impact on campaign outcomes. However, there is a need for further research focusing on RBCF from a process perspective, particularly concerning organization-led campaigns (Lehner and Harrer 2019; McKenny et al. 2017).

Secondly, despite the rising participation of arts and culture organizations in RBCF, several organizations are still reluctant to adopt such innovative financing methods because of their limited knowledge regarding the required processes, competencies, time, and resources (Hobbs et al. 2016). Hence, there is a need to understand why and how these organizations decide to seek crowdfunding.

Thirdly, further research is required to better understand the contextual interactions between the multiple streams of knowledge, competence, and social interaction (Bansal et al. 2018) that are present during the preparation and execution of RBCF campaigns (Lehner and Harrer 2019). Hence, in this research, we applied a trust perspective and process-based view to understand how team leaders seek to gain knowledge and competencies from these initiatives (Abrams et al. 2003; Huxham and Vangen 2005). This chapter aims to answer the following question: *How and why do cross-functional teams orchestrate preparation and execution processes in organization-led RBCF campaigns?*

To answer this question, the investigation focused on two arts and culture organizations, namely museums, with one located in the UK and the other in the US. Both have a reasonable offline reputation as established institutions. Particular attention was paid to cross-functional team leaders' knowledge exchange and development, as such processes can significantly enhance the formation of trusting environments throughout the preparation and execution of RBCF campaigns. We

explored the RBCF method because the museums in this study had adopted it for their project-based campaigns.

The chapter is organized as follows. Firstly, we present the theoretical and contextual background to organization-led RBCF initiatives, as well as a review of recurring themes. Secondly, we present our research methods and findings. Finally, we conclude with a discussion of the findings, the limitations of the study, and opportunities for further research.

3.2 Setting the Stage: Organizations and Opportunities

Many organizations in the arts and culture sector have discovered that the adoption of innovation (Coblence and Sabatier 2014) and commercial expansion (Kotler and Kotler 2000) often comprises many control systems (Wirtz 2011), including social-relational and professional competences (Glynn 2000).

When adopting new strategic funding methods, cultural institutions must consider the expectations of many stakeholders (Freeman et al. 2004). For example, a museum's facilities might be owned by a government or private institution(s). On the other hand, these institutions' non-profit divisions typically control and manage the collections, sales, acquisitions, earned income, and staff. Additionally, the commercialization of its branded products, restaurants, and other services might be delivered by independent providers (DiMaggio 2006; Jacobsen 2016; Schuster 1998). Such configurations are complex and require multi-layered deliberations to maximize the effects of strategic collaborations and serve the expectations and demands of multiple stakeholders (Huxham and Vangen 2005).

For quite some time, complexities have existed in arts and culture institutions (Woodson-Boulton 2012). Now, broader issues strain or, at times, derail such institutions' overall performance. For instance, as institutions add new professional actors with cutting-edge proficiencies in digital technology, development, or finance, new circles of interdisciplinary competencies solidify within the institutional core. As a result, intersections between creativity, digital technology, and financial need emerge (Khodyakov 2007), often leading to new ideological configurations (Glynn 2000). These new professional forces can become drivers for innovation within established institutions by pursuing novel business (Falk and Sheppard 2006) and funding methods (Decker 2015). Therefore, as the range of public and private interests in the sector increases, new influences on governance and policy continue to converge under the broad umbrella of arts and culture stewardship (DiMaggio 2006).

We describe the organizations studied in this chapter as institutions, which embody cultural, entertainment, and commercial undertakings (Caves 2002; Lampel and Germain 2015). These museums provide activities that cater to diverse tastes, including cultural, entertainment, and commercial value propositions (Caves 2002; Suddaby and Young 2015) across a diverse range of actors (Suddaby and Young 2015). In response to challenges that threaten their survival, these organizations, for

the most part, have adopted financing innovations (Coblence and Sabatier 2014) as well as ensuring that their existing resources are used effectively (Wirtz 2011) and transparently.

Progressively, arts and culture organizations are adapting traditional cultural and educational mandates and integrating them with new programming strategies and markets; for example, museums and galleries are developing programs and projects that can increase the commercialization of their products and services online (Falk and Sheppard 2006; Kotler and Kotler 2000; Sreenivasan 2015). Such considerations can lead established organizations in this sector to consider new funding methods as avenues for developing innovative programs, achieving financial patronage, and increasing online engagement. Therefore, an organization's decision to crowdfund often includes an assortment of considerations and stakeholders and is a rich topic for research.

In this study, we used a trust perspective to consider the multiple interrelated streams of knowledge, competence, and social interaction that comprise (Bansal et al. 2018; Möllering 2012) the preparation and execution of organization-led RBCF campaigns. In taking a process-based view, this study complements and extends the existing understanding of the preparation and execution of RBCF campaigns led by arts and culture organizations. The study of these processes is critical to understanding the development and integration of knowledge and competencies, as well as the social-relational development, that arise from the nexus of stakeholders' interests, ideologies, and expectations in this context.

3.3 Key Concepts: Opportunities and RBCF Initiatives

As the pursuit of innovation becomes a prominent endeavor in the arts and culture sector (Coblence and Sabatier 2014), the search for new funding methods has also intensified. A broader view of funding innovation may include, for example, the exchange and implementation of ideas, as well as processes new to an organization, its sector, or its market (Xiao and North 2018; Xiao and Ramsden 2016). In this regard, RBCF has attracted the attention of arts and culture organizations interested in exploring funding opportunities that also incorporate digital social engagement to enhance their online profiles (Chandnaa and Salimathb 2018; Lehner and Nicholls 2014).

3.3.1 Organization-Led RBCF

As discussed in the previous section, this chapter explores RBCF due to its popularity among arts and culture organizations. Such organizations typically use RBCF to fund a new idea, project, or venture by soliciting contributions from potential funders, generally through an online public appeal platform (Belleflamme et al.

2014; Mollick 2014). Accordingly, the projects are underwritten by the active participation of several funders (Mollick 2014; Mollick and Nanda 2015). Typically, the rewards offered by arts and culture organizations comprise an assortment of commercial project-related products, including tickets to exhibitions and live performances, that connect funders with the organization's brand and are determined by funders' contribution levels (Thürridl and Kamleitner 2016).

The crowdfunding environment continues to advance. Firstly, popular RCBF platforms have improved their offerings to creators by providing additional guidance through online or face-to-face workshops to help creators build their presentations and manage their campaigns more efficiently (Mitchell et al. 2017). Moreover, creators and funders now disseminate campaign information across multiple social media channels and media releases (Hui et al. 2014; Mollick and Nanda 2015). Prior research has found that crowdfunding expands the scope of traditional fundraising by increasing campaigns' geographical scale (Agrawal et al. 2015).

For museums, the RBCF model is an attractive proposition because a well-publicized crowdfunding campaign can promote an institution's brand globally. However, recent research has suggested that creators who focus their RCBF campaigns within specific geographical locations achieve significant financing and engagement benefits if they gain the support of local businesses, government entities, and communities (Giudici and Rossi-Lamastra 2018; Josefy et al. 2017; Cavalcanti Junqueira and Discua Cruz 2019). Hence, in some instances, the attraction of dedicated local and regional supporters is a strong contributor to the success of a crowdfunding campaign (Josefy et al. 2017).

As mentioned above, the RBCF literature has generally recognized the preparedness of creators (both individuals and organizations) as an important factor influencing the success of a campaign (Agrawal et al. 2013; Belleflamme et al. 2014). The broad concept of preparedness encompasses specific competence markers, such as the creation of compelling video messages, effective storytelling, frequent updates to funders, and the creator's background (Mollick 2014). However, research has also demonstrated that suitable rewards are equally essential to an RBCF campaign's success (Cholakova and Clarysse 2015; Thürridl and Kamleitner 2016). The rewards, updates, communications, and contributing exchanges of RBCF campaigns can generate additional income through the attraction of new audiences (Mollick 2014).

Despite the successes of several organization-led RBCF campaigns, previous studies found an increase in criticism of the preparation and management of such campaigns. Some of these concerns arise from the idea that creators must follow, for example, procedures that they may be neither willing nor able to adopt (Davidson and Poor 2015). For instance, traditional arts and culture organizations typically use lengthy and sometimes outdated forms of communication that fail to adequately leverage their message (Sands and Smith 2000; Wirtz and Zimbres 2018). In contrast, RBCF videos require digital editing, script development, and communication skills to produce short and convincing messages that compel funders to "join the journey" (Manning and Bejarano 2017, p. 194). Thus, the communication of an RCBF campaign's storyline requires new competencies, as well as attributes such as

persuasiveness and social awareness (Manning and Bejarano 2017) germane to interactive online environments (Beldad et al. 2010).

Other concerns may arise when organizational RBCF teams seek to explain crowdfunding to key internal stakeholders. For example, in preliminary discussions, the success of RCBF campaigns cannot be guaranteed (Gerber and Hui 2013; Mollick and Nanda 2015). Indeed, the RBCF model involves a certain level of vulnerability and uncertainty, including the possibility of failure and public scrutiny (Davidson and Poor 2015; Greenberg and Gerber 2014), thus creating a risk to the organization's reputation and brand. Additionally, crowdfunding campaigns require considerable dedication (Hui et al. 2014). Hence, for the duration of a campaign, staff may, for example, need to commit to working overtime on top of an already demanding schedule. These strands in the research continue to direct the literature in interesting directions (Lehner and Harrer 2019; Mollick and Nanda 2015). However, since questions remain about the processes influencing the preparedness and execution of organization-led RBCF campaigns, we are keen to explore some of the conceptions that might contribute to narrowing the research divide between RBCF success factors and campaign processes.

3.3.2 Interpersonal Trust Formation in the Context of Funding Innovations

The investigation of financing models that leverage social-digital innovation, such as crowdfunding, requires systematic exploration of the processes arising from the relevant social, knowledge, and competence associations. Therefore, in this study, we sought to understand the competence and relational dimensions of the creation of interpersonal trust in the context of cross-functional teams' preparation and execution of crowdfunding campaigns.

Mayer et al. (1995, p. 712) defined trust as "the willingness of a party to be vulnerable to the actions of another party." Trust usually involves a willingness to accept some uncertainty about the amount of information available and the actions of other actors (Mayer et al. 1995; Sztompka 1998). Understanding how stakeholders overcome uncertainty and other concerns about embarking on an innovative undertaking requires knowing how trustworthiness can be fostered and demonstrated within organizations (Dirks and Ferrin 2001; Huxham and Vangen 2005; Levin and Cross 2004). In other words, the development of trust between key stakeholders has the potential to become a prerequisite for successful organization-led RBCF campaigns. Perhaps more importantly, trust formation can also shape intraorganizational relationships and increase the importance of competencies and relational support, which in turn enable internal knowledge exchanges and, ultimately, lead to well-managed campaigns (Levin and Cross 2004; Tsai and Ghoshal 1998).

Like any innovation, an RBCF campaign can have adverse outcomes, affecting, for example, an organization's reputation and the professional and social interactions of the involved team members. The relational processes and tensions arising from conflicting artistic and business ideologies may also represent a challenge (Glynn 2000; Ruud 2000). These dynamics can become barriers to trust formation when organizations undertake complex initiatives involving highly specialized departments. For instance, some departmental ideologies might prompt staff to question whether crowdfunding is an acceptable model, and RBCF team members' decisions and actions may affect trust and participation across departments and organizational levels (Currall and Inkpen 2002; McKnight et al. 1998). Bearing in mind these complex interactions and interpersonal trust formation between multiple internal stakeholders, it becomes apparent that organizational teams' efforts to prepare and execute RBCF campaigns are different from campaigns led by individuals who rely solely on the decisions of one or a few creators.

Organizations that assemble cross-functional teams for a specific task or project often encounter challenges regarding competencies and relationships (Colquitt et al. 2007). McAllister (1995) argued that within organizations, interpersonal trust between professionals is based on cognitive knowledge and competence, whereas relational (i.e., affective) trust relies on the upholding of the interests of others. Going further, Mayer et al. (1995) attributed the formation of trust to a purposeful intention by the trustees, or those seeking trust, to demonstrate competence, benevolence, and integrity during focused interactions (Mayer et al. 1995). In this context, the benevolence and care expressed by RBCF leaders during campaign deliberations can demonstrate their willingness to respect trustors' (i.e., other internal stakeholders) interests. Notably, while the existing literature has found that these dimensions are fundamental to trust, cooperation, and knowledge exchange over time (Abrams et al. 2003; McEvily et al. 2003), it has not considered the processes by which organizations' RBCF teams can address stakeholders' ideologies and expectations within rapid and time-limited crowdfunding initiatives.

When organizations pursue innovative funding methods, they are well-placed to review their internal practices to ensure that they facilitate internal stakeholders' interactions, decisions, and actions. Therefore, our examination of trust formation illustrated the processes by which intraorganizational RBCF collaborations occur through interactions between cross-functional RBCF teams, departments, and other key stakeholders.

3.4 Methods

3.4.1 Context: Arts and Culture Organizations

The idea of arts and culture organizations adopting entrepreneurial and innovative funding practices is nothing new (Hagoort 2003; Klamer 2011; Swedberg 2006). For the past two decades, governments and economic forums worldwide have called for

such organizations to seek new funding opportunities, become more entrepreneurial, and develop financial acumen (Gradén and O'Dell 2017; Leventhal and Zeylikovich 2015; Pickles 2015). Economic fluctuations and new fiscal priorities have played a critical role in this shift (Leventhal and Zeylikovich 2015; Pickles 2015). In response, organizations have tried to adapt and seek new opportunities to implement innovative measures (Byrnes 2015; Decker 2015).

One approach to understanding funding environments in this context is to examine fundraising and strategic planning as coordinated processes (Decker 2015; DiMaggio 2006; Falk and Sheppard 2006; Kotler et al. 2008). For instance, museums usually plan exhibitions and programming 5 to 10 years in advance, allowing time to shape their ideas and develop options for raising a sufficient, though realistic, level of capital (Smithsonian Institution 2002). However, to ensure the flow of state-of-the-art knowledge and resources, it has become common for organizations to continuously cultivate their audiences and networks (Leventhal and Zeylikovich 2015). Therefore, an organization's competitive programming, digital interactions, commercial offerings, and services are all intended to generate financial and social support from committed constituencies, as well as achieving additional engagement from new audiences (Kaiser and Egan 2013; Kotler and Kotler 2000). This can facilitate the revival or expansion of existing support networks while enlisting new supporters' participation.

3.4.2 Research Approach

In this study, we used qualitative methods (Gioia et al. 2013), given that they are well-suited to studying processes and participant associations (Langley et al. 2013). The selection of the institutions studied was also purposeful; the author obtained access to organizations through professional relationships within the UK and US arts and culture sectors. This approach facilitated the engagement with key administrators and staff at the selected museums. Additionally, archival data, videos, written narratives, updates and feedback, digital media data, specialized reports, and news press related to these campaigns were also examined.

The author gathered the data through in-depth, open-ended interviews with four key team members over 3 months. On average, each interview lasted around 90 min, and all were conducted on the museums' premises, which allowed for further investigation of the organization's physical environment. Supporting interviews included one principal RBCF platform officer, one corporate contributions representative, and one traditional principal patron, and were conducted both in person and online. Lastly, the author also attended the launch of the two projects that resulted from the museums' RBCF initiatives. Table 3.1 presents an overview of the selected campaigns.

Interpretative methods were used to analyze how and why cross-functional teams prepared and executed organization-led RBCF campaigns. Firstly, the author reviewed the information from post-interview memos, then compared with data

Table 3.1 Selected RBCF museums in this study

Campaigns	Cross-functional Depts.	Reason for crowdfunding	Country	Type of project	Platform scope
1. Far East (FEC)	Development, Communications, Marketing, Curatorial	*We had less than a year to fundraise for a big exhibition. And we could build audiences around it. An exciting opportunity!*	UK	Contemporary	Major
2. PRISM (PRS)	Development, Marketing, Curatorial	*We searched for new and creative ways to raise money...The reason we chose (project) was that the exhibit had a community aspect to it. We wanted to expand our community*	USA	Contemporary	Major

Fictitious names are used to assure anonymity of organizations and individuals (Gioia et al. 2013)

controls (Miles et al. 2014), including essential data sources (i.e., the platform project site, digital media data, videos, narratives, press coverage, and screen-based and archival documents). The data sources were then organized using NVivo Pro Version 11; this program was selected because it accepts a number of data formats. The coding was an iterative process, with themes being refined or abandoned until first-order concepts surfaced. Secondly, the author further refined these concepts in light of the experiences of cross-functional team members and other key actors to identify second-order themes. Subsequently, the choices were compared regarding the processes adopted by RBCF team leaders when interacting with internal stakeholders. This data analysis approach provided an understanding of the synergetic approaches involved in the relevant preparation and execution processes.

3.5 Analysis

This study used competence and relational dimensions as the foundations for discussing the preparation and execution of RBCF campaigns. These dimensions firmly underpin the processes presented in Table 3.2, which illustrates cross-functional teams' preparation for and execution of organization-led RBCF campaigns.

The final, downstream, stage includes the reflections of individual cross-functional team members, providing a wider lens for future research. The overall process is not linear. At times, team members had to readdress and renegotiate, for example, concerns that were first presented in the upstream stage. Therefore, in

Table 3.2 Organization-led RBCF processes: upstream, midstream and downstream stages, and transitions

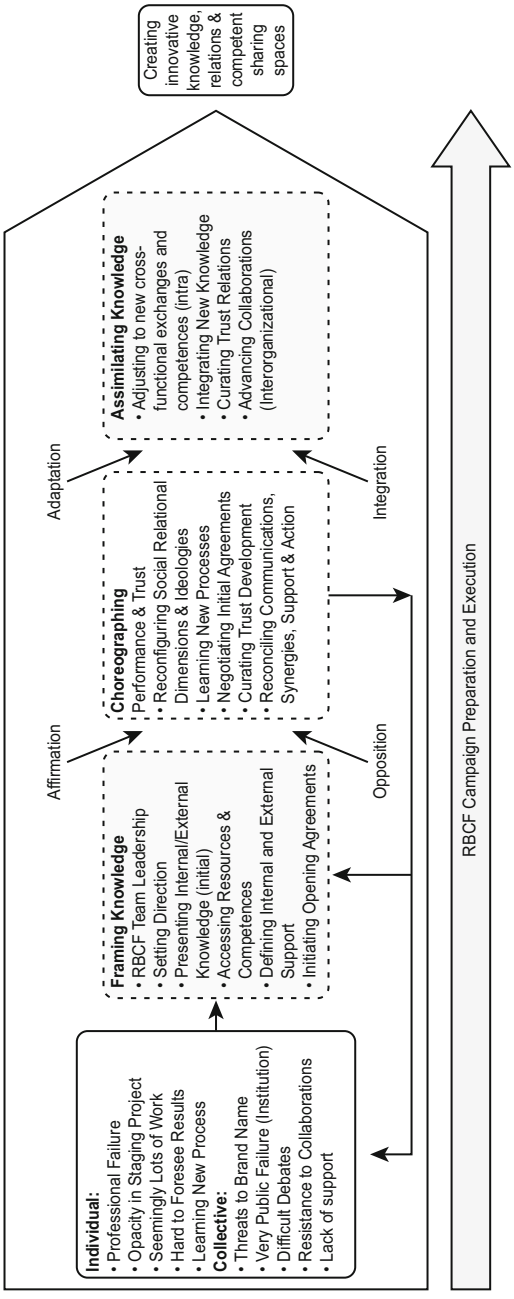

Table 3.2, the stages and transitions indicate recurrent deliberations and processes. The narratives of the respondents for the two cases in Table 3.1, FAE (UK) and PRS (US), as well as the platform representative, corporate contributor, and traditional principal patron, informed the findings that are examined in the next section.

3.5.1 Competence-Based Trust Formation

According to the FAE and PRS representatives, the orchestration of intraorganizational RBCF campaigns took time, effort, and consistency. In both cases, the formation of trust relied on the ability of each RBCF leadership team to demonstrate their knowledge and skills to the rest of the organization (Colquitt et al. 2007; Mayer et al. 1995). In instances where the teams lacked answers or did not have the necessary campaign-related skills, their resourcefulness in bringing sector experts (e.g., representatives from other museums that had successfully used RBCF) and platform representatives to explain the necessary processes and implications of crowdfunding formed the initial foundation for the formation of trust between internal stakeholders.

3.5.2 Initializing Intraorganizational RBCF Collaborations

Table 3.1 shows the reasons given by intraorganizational team members for their adoption of RBCF. Another perspective was offered by a financial sector professional whose large firm has a program for contributions to arts and culture organizations. She explained why her firm decided to begin contributing to such organizations' RBCF campaigns:

> I think crowdfunding is one of the newest approaches for the arts and culture scene, and people are really taking a look at it. I mean, organizations may be used to filling out 50 pages or more of strict forms to get grants, for example. But the times when it was easier to get money in the form of grants and other types of finance for the arts are not so much now. Even to get corporate sponsorships is not that easy anymore. And so ... established cultural institutions have to take their fate into their own hands and try something new and different. And it is not enough to say; I have a great project give me some money... Now, you have to take responsibility for the project and how the idea is digitally communicated, and you have to think about how you are going to do the project and be very clear about it. And I think this is good because then the whole funding scene is changing, and crowdfunding is showing that people are becoming more experienced about how to present and do their projects. (Financial Sector Firm Contributions Director)

Solving these new challenges, however, was not a straightforward process for the campaigns examined in this study. Often, organizations must invest time in providing sufficient information regarding the skills and practices required to successfully steer such a campaign. According to the FAE and PRS respondents, the process

intrinsically requires multi-layered considerations before campaign development can even begin.

After the preliminary RBCF proposals were presented in the upstream stage (Table 3.2), both organizations embarked on a transitional initiation stage. In an interview, a campaign advisor for a major international RBCF platform, whose role is to provide guidance to museum-led campaigns, mentioned the significance of cross-functional teams. The advisor also highlighted the difference between individual and organization-led campaigns:

> Institutions' coordination across teams is really key, and I think that's probably the biggest difference that I would say between institutions and individuals doing projects. So, it is a cross-collaboration … this is actually what trends well with museums … so it is being strategic about how you are going to achieve community together, and strategic about how you are going to do all of that… lots of preparations before launching a campaign to enable you to position yourself well for support. (Major RBCF Platform Officer)

During the initiation stage, intraorganizational discussions in both institutions consisted of question-and-answer workshops designed to provide knowledge and build trust between internal stakeholders. Consistent with other "high-uncertainty and high-vulnerability contexts" (Möllering 2012, p. 2), the RBCF campaigns proceeded swiftly. In this regard, the presentation of reliable information and strategic knowledge (Wirtz 2011) by the RCBF teams enhanced the quality and timeliness of the decision-making process (Martin and Eisenhardt 2010). According to respondents, this knowledge-sharing stage was necessary to provide information regarding the opportunity represented by RCBF, as well as to assemble the competences required to meet the demands of each campaign while safeguarding the institutions' reputation and brand (Cabral 2012; Negro et al. 2014; Preece 2011).

The interview responses, observations, and screen-based and archival sources all confirmed that both FAE and PRS had emphasized the collection of detailed information, such as data and cost analyses. Teams had to decide whether RBCF was a feasible alternative to traditional forms of fundraising. Similarly, even in temporary collaborations, collaborators expect associates to display competence and deliver on agreements (Das and Teng 1998).

Respondents from both museums discussed the importance of including external experts (i.e., ex-creator museums, industry experts, platform representatives) in the initial information sessions to support decision-making, including concerning the team's skills and configuration. Overall, this approach increased the knowledge and lessened the reservations of internal stakeholders. The information sessions also incorporated discussions on strategic digital engagement and communications, internal competencies, and other significant challenges, such as overtime and extra work duties for key staff. According to the respondents from FAE, these procedures yielded promising results in later discussions and led to collective buy-in among internal stakeholders.

3.5.3 Formation of Relational Trust

In addition to competence-based trust, relational or interpersonal trust ensured that the relationships formed in this context reflected prosocial behaviors and demonstrated regard for the interests of internal stakeholders (Mayer et al. 1995; McAllister 1995). Leading FAE and PRS team members indicated that steering internal stakeholders towards shared goals to create value for the initiative was a challenge (Freeman et al. 2004). Both FAE and PRS respondents reported a combination of affirmation and opposition from key stakeholders towards the RBCF initiatives. Therefore, respondents' attempts to form and enhance social synergies required the purposeful steering of relational processes.

3.5.3.1 Steering Intraorganizational Collaborations

Innovative initiatives can become contentious if departments cannot coordinate and integrate different ideologies (Glynn 2000; Ruud 2000). Therefore, cross-functional team respondents discussed projects at length before electing the "right one" (PRS). The interviews with cross-functional team members and experts, as well as the observations and archival data, indicated that a collaborative selection of the right project, coupled with an appropriate narrative and suitable rewards, encouraged shared ownership of the RBCF projects across multiple departments. Furthermore, the selection of the right RBCF platform was also key. Both the FAE and PRS teams selected large RBCF platforms because they were aiming to reach international audiences.

Team members from both museums drew their understanding of RBCF from general knowledge based on familiar concepts (Abrams et al. 2003). However, staff members struggled with unfamiliar applications of crowdfunding. A leading team member from PRS explained:

> Well, as you have probably heard before from other institutions, we all have our own standard fundraising mechanisms. So, introducing this new form of fundraising took some time . . . I invited the (platform) Director of Arts to come in and speak with the key internal stakeholders of the museum, being marketing, curatorial and development. Once these departments got familiar with it, we also brought in more people (from the organization). So, it was a multi-stepped process, sort of like an introduction and orientation to how (platform) and crowdfunding works and how the campaign is interrelated between departments. That might seem obvious, but I think because it was a new concept, and another layer of extra work, it was very helpful to have a person from (platform) answer questions and help people to feel familiar and comfortable with this new process.

Team leaders also emphasized the relevance of "critical conversations" (PRS). Research on innovation has indicated that such conversations can reveal social attributes that may stimulate discussion, innovation, and knowledge creation (Lester and Piore 2004; Liedtka and Rosenblum 1996). Respondents noted that these conversations with internal stakeholders and external experts were essential for

sharing knowledge and fostering trust to initiate cooperation and innovation within their organizations.

As shown in Table 3.1, each organization has several specialized departments, sometimes labeled as "silos" in organizational studies (Gulati 2009). It was challenging for the organizations to integrate these different departments. For example, the FAE team leaders had to contend with issues of divergent departmental ideologies (e.g., differences of opinion between artistic staff and funding specialists). Financial concerns relating to the selected project/exhibition also surfaced (Glynn 2000; Ruud 2000). Doubts were raised about the general appropriateness of staging a crowdfunding campaign. An FAE team member commented:

> On the other side, there were a lot of risks you know. If we failed, we would fail very publicly. . . our target was very ambitious. There had not been a crowdfunding campaign for that type of exhibition before for that level . . . Not anywhere near that amount up to that point . . . There were lots of concerns that we might be undermining the integrity of the show that was about to start. So, we had to keep all of the parties happy.

Accordingly, both organizations tried to address issues from the projects' inceptions, through ongoing discussion and knowledge sharing. Respondents asserted that this enabled the development of a trusting environment, resulting in better-quality communication in subsequent stages (Martin and Eisenhardt 2010). Most team members realized that it would be challenging to manage the project following the launch if broader questions remained unresolved. The PRS team had already undertaken the research and had the necessary skills to launch the project, and thus felt confident about this aspect of the initiative. Nevertheless, the decision to crowdfund meant that the processes of trust formation among team members had to be renegotiated and readjusted (Kong et al. 2014), because such an approach required additional skills and further effort in a short period.

In this study, cross-functional team respondents from FAE and PRS shared a determination to engage with key internal stakeholders, including directors, boards, trustees, and principal patrons. The teams hoped to mobilize major stakeholders and their networks (Preece 2011) to support the RBCF initiatives. Firstly, however, the teams had to convince key internal stakeholders to become partners in developing the initiative, while also accepting the influence of those individuals (Gregory 2007) on the campaign deliberations. As one team member explained, *"I think the campaign was very conducive to asking people* (e.g., governance and key stakeholders) *to tap into their networks"* (PRS). Therefore, the campaign leaders continued to network with key internal stakeholders throughout the projects; the latter were often invited and encouraged to participate in information sessions.

The involvement of key internal stakeholders, however, depended on their level of interest (Johnson et al. 2017). For example, a second-generation principal patron raised a concern:

> You know, I am not a particular fan of crowdfunding because, for instance when we fund something we are committed, we are part of it usually for the long haul, and we like that our relationship with the museum is personal. So, in this very personal approach, there is an element that we take a little bit of ownership, we also take the responsibility towards the project and the institution itself. And I don't know; I do not think that there is the same

> commitment with crowdfunding. Sure, they do help with the funding some but sometimes they are just there for the project, and they are gone... But, when my husband and I say yes, we are definitely in for over the long distance. So, I am not sure if crowdfunding nurtures that.

This response illustrates the serious concerns that RBCF project leaders in both cases had to face. Team leaders knew they had to address the concerns of such stakeholders. For example, the PRS team decided that it was vital to inform traditional patrons of crowdfunding's dual benefits. Respondents emphasized that crowdfunding should be presented to patrons as both a fundraising approach and an avenue for raising an organization's online profile to attract untapped digital audiences (Truong et al. 2010).

In contrast, for FAE, the idea to crowdfund was facilitated by motivated trustees with large networks who had been actively involved since the initial stage of the project. Later, those trustees continued to disseminate campaign messages via social media channels. FAE respondents viewed this action as positive. As one team leader said, *"As you probably know, in our field we are always trying to engage the board more. So, this campaign was an option for them to 'show off' the institution they help govern and send to their friends and families, and of course, it passes on"*. In this respect, respondents indicated that when key internal stakeholders approached their networks for endorsements (Johnson et al. 2017), it was perceived as a "safety net" (McAllister 1995) benefitting the RBCF team, organization and campaign.

The PRS team noted the importance of extending the information sessions to staff and volunteers who were not directly involved in the campaign, including employees from guest services and the restaurant and museum shop. The goal was that these individuals would support the initiative and trust the RBCF team's leadership. Respondents reported that many of these staff members became willing front-line ambassadors for their organizations' RBCF campaigns. Overall, respondents felt that building a robust relational base was essential to the success of the campaigns. Nevertheless, to further the development of the RBCF campaigns, further ongoing trust-building was necessary.

3.5.3.2 Finalizing Intraorganizational Trusting Relationships

In general, both FAE and PRS respondents insisted that frequent communication between departments was essential to sustaining trust, momentum, and motivation throughout the campaigns. In many instances, such communication included purposeful interactions with key internal stakeholders, thus creating an atmosphere of trust across multiple organizational levels (Currall and Inkpen 2002).

Towards the finalization transition and downstream stage of their projects (Table 3.2), both teams adapted and integrated new competencies and knowledge. Ongoing trust formation facilitated "mutual bonding" (Child 2015, p. 421) among internal stakeholders. Both campaigns discussed, to varying degrees, the relational benefits arising from the crowdfunding initiatives. According to an FAE team member:

> Once it started and people, in particular, the creative side of the organization realized that this was helping the exhibition and it was not undermining it or losing its integrity, then the whole organization got behind it. I can tell you that because when we got to the finishing line, the whole of our office just stopped and watched the countdown, which was absolutely remarkable to see and be the big motivation force within the organization. It was a different thing because we had positioned it like such a positive thing. People could not help but to get it. So, the whole organization was proud of the campaign.

A PRS team leader stated that the cross-functional team collaborations with other internal stakeholders added significant value to the organization: *"People were really excited about the campaign and they were posting on their Facebook pages and sharing with their families and friends like 'this is where I work' and 'this is what we are doing."* Team members also noted that both internal stakeholders and funders provided positive feedback after the campaigns concluded. One lasting impression from a team member was that the crowdfunding *campaign "made us look bold and innovative. I think we also underestimated the amount of good feeling that is out there, that there is a lot of people who want to be involved, so in some ways, we could have been even bolder"* (FAE).

Team members from both campaigns noted, however, that preparing and executing an RBCF campaign requires a substantial amount of work, time, and ongoing management of high-stress situations. Therefore, both teams agreed that a cross-functional team approach is essential. The FAE and PRS representatives indicated that they would not have considered preparing and executing the RBCF campaign without a team-based approach.

Respondents also suggested some surprising benefits emerging from their participation in RBCF. For example, the crowdfunding experience became a powerful tool by which to engage with other arts and culture organizations. Indeed, both museums became leading advisers to other museums interested in RBCF and innovative funding approaches. Research has suggested that reflection is an important part of the process of entrepreneurial and adult learning because it encourages learners to question their previous assumptions and enhances knowledge acquisition (Cope 2003). In this regard, respondents stated that their RBCF experiences had influenced the campaign results, their intraorganizational competence, and relational processes.

3.6 Discussion

This study investigated the research question: how and why do cross-functional teams orchestrate preparation and execution processes in organization-led RBCF crowdfunding? Our findings support the view that research on the preparation and execution of organization-led RBCF campaigns enables a better understanding of the crowdfunding experiences of arts and culture organizations. This study complements and extends in three ways the body of literature on crowdfunding and innovation.

Firstly, Martin and Eisenhardt (2010) argued that superior team performance and effective collaboration require the purposeful dissemination of information. They proposed that such an approach facilitates social understanding and motivational alignment within groups. This study complemented and expanded on this notion. Notwithstanding the respondents' initial fear of failure in the upstream stage (Table 3.2), the practices were critical for the formal adoption of innovative financing methods during the initial transition stage. By acquiring knowledge and developing trust among cross-functional team members and other internal stakeholders, these RBCF teams increased the likelihood of positive campaign outcomes. Cooperative exchanges might not have occurred had multiple internal stakeholders not trusted the initiative and the RBCF teams' leadership (Jones and George 1998). Thus, this study advances the crowdfunding literature by identifying that the RBCF team leaders' decisive recruitment of external knowledge sources, such as the representatives of crowdfunding platforms and experts from other arts and culture organizations, strategically addressed and reduced feelings of distrust and opposition among internal stakeholders. This process greatly increased internal support for the project and trust in the process and the team members, leading to stakeholder buy-in.

Secondly, the data collected in this study shows that RBCF team leaders' attempts to reconcile diverging artistic and business ideologies (Glynn 2000; Ruud 2000) were invaluable to the campaigns. This demonstration of prosocial interpersonal attitudes and competence was the foundation for the perceptions of trustworthiness (Mayer et al. 1995; Schoorman et al. 2007) necessary to initiate productive intraorganizational conversations and active collaboration. Indeed, the adaptation and integration of the different specialties (Lawrence and Lorsch 1969, p. 8), ideologies (Glynn 2000), and competencies of the internal stakeholders were prerequisites to entering the finalization transition and implementing the knowledge gained through the projects.

Thirdly, the most significant finding pertains to the RBCF team engagement with key internal stakeholders. The internal stakeholders' advocacy and social media endorsements strengthened the campaigns and helped create a collective ownership for the project. Involving such key actors in the campaign's preparation and execution contributed to a relationship of mutual support and trustworthiness between the RBCF teams and internal stakeholders. More importantly, both campaigns were pleased and surprised by the level of trust, and collaboration arising from these intraorganizational relationships, as reflected in Table 3.2. Additionally, trust-building became an integral part of the cross-functional teams' relational and competence-based approaches because they perceived the experience as leading to an increase in innovation and knowledge-sharing both during the campaigns and beyond.

3.7 Conclusion

Previous crowdfunding studies have focused on the success factors primarily observed in individual- or startup-led campaigns. However, the preparation and execution processes of organization-led RBCF campaigns in the arts and culture sector have not been comprehensively studied.

Thus, our study contributes to the crowdfunding and innovation literature by illuminating the processes that organizations follow when preparing and executing RBCF campaigns. The decision to disseminate information during the preparation stages enabled the formation of the competence and relational dimensions of interpersonal trust. This initial trust formation influenced the later stages of the campaigns. Focusing narrowly on the RBCF team leaders' efforts to engage multiple internal stakeholders also provided new insights into the social-relational dimensions of these internal project-based associations. The exchange and communication of knowledge and skills arising from this experience was an additional, and equally important, consequence of the adoption of the RBCF initiatives explored in this study.

3.8 Limitations and Implications for Future Research

Notwithstanding these key contributions, this study has some limitations. Firstly, the findings presented in this article are specific to the organizations that were studied. Secondly, the study focused exclusively on two successful organization-led RBCF campaigns. Thirdly, the selected organizations' RBCF teams played an active role in developing and reinforcing competence-based and relational interpersonal trust throughout their campaigns. These characteristics are limitations because they indicate that additional research is needed to investigate situations where these features are not present.

Since the literature on organization-led crowdfunding campaigns in the arts and culture sector is limited, additional theoretical and empirical research is needed to understand the possible interplay between intra- and interorganizational collaborations. In this respect, as governments and public forums continue to encourage cultural institutions to seek innovative funding sources, future multidisciplinary research could investigate the roles of governments, private firms, and philanthropic foundations in this context.

Acknowledgments The author gratefully acknowledges the Lancaster University Management School (LUMS) for this research's funding support. The author wishes to thank Dr. Li Xiao, and Dr. Allan Discua Cruz for their input on earlier versions of this research. Finally, the author would like to thank the editors, Dr. Jin Chen and Dr. Regina Lenart-Gansiniec for their constructive and helpful comments.

References

Abrams LC, Cross R, Lesser E, Levin DZ (2003) Nurturing interpersonal trust in knowledge-sharing networks. Acad Manag Perspect 17:64–77

Agrawal A, Catalini C, Goldfarb A (2013) Some simple economics of crowdfunding. National Bureau of Economic Research, Cambridge, MA

Agrawal A, Catalini C, Goldfarb A (2015) Crowdfunding: geography, social networks, and the timing of investment decisions. J Econ Manag Strategy 24:253–274

Anglin AH, Short JC, Drover W, Stevenson RM, McKenny AF, Allison TH (2018) The power of positivity? The influence of positive psychological capital language on crowdfunding performance. J Bus Ventur 33:470–492

Bansal P, Smith WK, Vaara E (2018) New ways of seeing through qualitative research. Acad Manag J 61:1189–1195

Beldad A, de Jong M, Steehouder M (2010) How shall I trust the faceless and the intangible? A literature review on the antecedents of online trust. Comput Hum Behav 26:857–869

Belleflamme P, Lambert T, Schwienbacher A (2014) Crowdfunding: tapping the right crowd. J Bus Ventur 29:585–609

Byrnes WJ (2015) Management and the arts, 5th edn. Focal Press, New York and London

Cabral L (2012) Reputation on the internet. In: Peitz M, Waldfoge J (eds) The Oxford handbook of the digital economy. Oxford University Press, Oxford, pp 343–354

Cavalcanti Junqueira MI, Discua Cruz A (2019) Crowdfunding and museums: a field trip exemplar in the United Kingdom. Entrep Educ Pedagogy 2:151–170

Caves RE (2002) Creative industries: contracts between art and commerce. Harvard University Press, Cambridge, MA

Child J (2015) Organization: contemporary principles and practice, 2nd edn. Wiley, Chichester

Chandnaa V, Salimathb MS (2018) When technology shapes community in the cultural and craft industries: understanding virtual entrepreneurship in online ecosystems. Technovation

Cholakova M, Clarysse B (2015) Does the possibility to make equity investments in crowdfunding projects crowd out reward-based investments? Entrep Theory Pract 39:145–172

Coblence E, Sabatier V (2014) Articulating growth and cultural innovation in art museums. Int Stud Manag Organ 44:9–25

Colquitt JA, Scott BA, LePine JA (2007) Trust, trustworthiness, and trust propensity: a meta-analytic test of their unique relationships with risk taking and job performance. J Appl Psychol 92:909–927

Cope J (2003) Entrepreneurial learning and critical reflection: discontinuous events as triggers for 'higher-level' learning. Manag Learn 34:429–450

Currall SC, Inkpen AC (2002) A multilevel approach to trust in joint ventures. J Int Bus Stud 33:479–495

Das TK, Teng BS (1998) Between trust and control: developing confidence in partner cooperation in alliances. Acad Manag Rev 23:491–512

Davidson R, Poor N (2015) The barriers facing artists' use of crowdfunding platforms: personality, emotional labor, and going to the well one too many times. New Media Soc 17:289–307

Decker J (2015) Fundraising and strategy planning: innovative approaches for museums. Rowman & Littlefield, New York

DiMaggio P (2006) Nonprofit organizations and the intersectoral division of labor in the arts. In: Powell WW, Steinberg R (eds) The nonprofit sector: a research handbook. Yale University Press, New Haven, pp 432–461

Dirks KT, Ferrin DL (2001) The role of trust in organizational settings. Organ Sci 12:450–467

Falk JH, Sheppard BK (2006) Thriving in the knowledge age: new business models for museums and other cultural institutions. Altamira Press, Lanham, MD

Freeman RE, Wicks AC, Parmar B (2004) Stakeholder theory and "the corporate objective revisited". Organ Sci 15:364–369

Gerber EM, Hui J (2013) Crowdfunding: motivations and deterrents for participation. ACM Trans Comput Hum Interact 20:1–32
Gioia DA, Corley KG, Hamilton AL (2013) Seeking qualitative rigor in inductive research. Organ Res Methods 16:15–31
Giudici G, Rossi-Lamastra C (2018) Crowdfunding of SMEs and startups: when open investing follows open innovation. In: Researching open innovation in SMEs. World Scientific Publishing, New York, pp 377–396
Glynn MA (2000) When cymbals become symbols: conflict over organizational identity within a symphony orchestra. Organ Sci 11:285–298
Gradén L, O'Dell T (2017) Museums and heritage collections in the cultural economy: the challenge of addressing wider audiences and local communities. Mus Int 68(3–4):48–67. https://doi.org/10.1111/muse.12135
Greenberg MD, Gerber EM (2014) Learning to fail: experiencing public failure online through crowdfunding. In: SIGCHI conference on human factors in computing systems. ACM Press, New York, pp 581–590
Gregory A (2007) Involving stakeholders in developing corporate brands: the communication dimension. J Mark Manag 23:59–73
Gulati R (2009) (Re)(organize) for resilience. Harvard Business Press, Boston, MA
Hagoort G (2003) Art management: entrepreneurial style. Eburon, Delft, Netherlands
Hobbs J, Grigore G, Molesworth M (2016) Success in the management of crowdfunding projects in the creative industries. Internet Res 26:146–166
Hui JS, Greenberg MD, Gerber EM (2014) Understanding the role of community in crowdfunding work. In: Proceedings of the 17th ACM conference on computer supported cooperative work & social computing. ACM, Baltimore, MD, New York, NY, pp 62–74
Huxham C, Vangen S (2005) Managing to collaborate: the theory and practice of collaborative advantage. Routledge, London
Jacobsen JW (2016) Measuring museum impact and performance: theory and practice. Rowman & Littlefield, London
Johnson G, Whittington R, Scholes K, Angwin D, Regnér P (2017) Exploring strategy: test & cases, 11th edn. Pearson Education Limited, Harlow, UK
Jones GR, George JM (1998) The experience and evolution of trust: implications for cooperation and teamwork. Acad Manag Rev 23:531–546
Josefy M, Dean TJ, Albert LS, Fitza MA (2017) The role of community in crowdfunding success: evidence on cultural attributes in funding campaigns to "save the local theater". Entrep Theory Pract 41:161–182
Kaiser MM, Egan BE (2013) The cycle: a practical approach to managing arts organizations. Brandeis University Press, Waltham, MA
Khodyakov DM (2007) The complexity of trust-control relationships in creative organizations: insights from a qualitative analysis of a conductorless orchestra. Soc Forces 86:1–22
Klamer A (2011) Cultural entrepreneurship. Rev Austrian Econ 24:141–156
Kong DT, Dirks KT, Ferrin DL (2014) Interpersonal trust within negotiations: meta-analytic evidence, critical contingencies, and directions for future research. Acad Manag J 57:1235–1255
Kotler N, Kotler P (2000) Can museums be all things to all people? Missions, goals, and marketing's role. Mus Manag Curatorsh 18:271–287
Kotler NG, Kotler P, Kotler WI (2008) Museum strategy and marketing: designing missions, building audiences, generating revenue and resources, 2nd edn. Jossey-Bass, San Francisco
Lampel J, Germain O (2015) Creative industries as hubs of new organizational and business practices. J Bus Res 69:2327–2333
Langley A, Smallman C, Tsoukas H, Van de Ven A (2013) Process studies of change in organization and management: unveiling temporality, activity, and flow. Acad Manag J 56:1–13
Lawrence PR, Lorsch JW (1969) Organization and environment: managing differentiation and integration. Richard D. Irwin, Homewood, IL

Lehner OM, Harrer T (2019) Crowdfunding revisited: a neo-institutional field-perspective. Venture Cap 21:75–96
Lehner OM, Nicholls A (2014) Social finance and crowdfunding for social enterprises: a public-private case study providing legitimacy and leverage. Ventur Cap 16(3):271–286
Lester RK, Piore MJ (2004) Innovation—the missing dimension. Harvard University Press, Cambridge, MA
Leventhal JG, Zeylikovich I (2015) Relevance and twenty-first century fundraising fundamentals. In: Decker J (ed) Fundraising and strategic planning: innovative approaches for museums. Rowman & Littlefield, New York, pp 95–102
Levin DZ, Cross R (2004) The strength of weak ties you can trust: the mediating role of trust in effective knowledge transfer. Manag Sci 50:1477–1490
Liedtka JM, Rosenblum JW (1996) Shaping conversations: making strategy, managing change. Calif Manag Rev 39:141–157
Manning S, Bejarano TA (2017) Convincing the crowd: entrepreneurial storytelling in crowdfunding campaigns. Strateg Organ 15:194–219
Martin JA, Eisenhardt KM (2010) Rewiring: cross-business-unit collaborations in multibusiness organizations. Acad Manag J 53:265–301
Mayer RC, Davis JH, Schoorman FD (1995) An integrative model of organizational trust. Acad Manag Rev 20:709–734
McAllister DJ (1995) Affect- and cognition-based trust as foundations for interpersonal cooperation in organizations. Acad Manag J 38:24–59
McEvily B, Perrone V, Zaheer A (2003) Trust as an organizing principle. Organ Sci 14:91–103
McKenny AF, Allison TH, Ketchen DJ, Short JC, Ireland RD (2017) How should crowdfunding research evolve? A survey of the entrepreneurship theory and practice editorial board. Entrep Theory Pract 41:291–304
McKnight DH, Cummings LL, Chervany NL (1998) Initial trust formation in new organizational relationships. Acad Manag Rev 23:473–490
Miles MB, Huberman AM, Saldaña J (2014) Qualitative data analysis: a methods sourcebook, 3rd edn. Sage, Thousand Oaks, CA
Mitchell S, Bone J, Baeck P (2017) Matching the crowd - combining crowdfunding and institutional funding to get great ideas off the ground. NESTA, London
Möllering G (2012) Trusting in art: calling for empirical trust research in highly creative contexts. J Trust Res 2:203–210
Mollick E (2014) The dynamics of crowdfunding: an exploratory study. J Bus Ventur 29:1–16
Mollick E, Nanda R (2015) Wisdom or madness? Comparing crowds with expert evaluation in funding the arts. Manag Sci 62:1533–1553
Negro G, Hannan MT, Fassiotto M (2014) Category signaling and reputation. Organ Sci 26:584–600
Pickles M (2015) How can cultural organizations become more entrepreneurial? World Economic Forum. https://www.weforum.org/agenda/2015/09/how-can-cultural-organisations-become-more-entrepreneurial/. Retrieved 4 November 2015
Preece SB (2011) Performing arts entrepreneurship: toward a research agenda. J Arts Manag Law Soc 41:103–120
Ruud G (2000) The symphony: organizational discourse and the symbolic tensions between artistic and business ideologies. J Appl Commun Res 28:117–143
Sands GC, Smith RJ (2000) Organizing for effective marketing communications in higher education: restructuring for your competitive edge in marketing. J Mark High Educ 9:41–58
Schoorman FD, Mayer RC, Davis JH (2007) An integrative model of organizational trust: past, present, and future. Acad Manag Rev 32:344–354
Schuster JM (1998) Neither public nor private: the hybridization of museums. J Cult Econ 22:127–150
Smithsonian Institution (2002) The making of exhibitions: purpose, structure, roles and process. Smithsonian Institution, Washington, DC

Sreenivasan S (2015) How the MET approaches innovation. In: Je D (ed) Technology and digital initiatives: innovative approaches for museums. Rowman & Littlefield, London, pp 95–100
Suddaby R, Young R (2015) The art of the form: a configurational perspective. Entrep Theory Pract 39:1371–1377
Swedberg R (2006) The cultural entrepreneur and the creative industries: beginning in Vienna. J Cult Econ 30:243–261
Sztompka P (1998) Trust, distrust and two paradoxes of democracy. Eur J Soc Theory 1:19–32
Thürridl C, Kamleitner B (2016) What goes around comes around? Rewards as strategic assets in crowdfunding. Calif Manag Rev 58:88–110
Truong Y, McColl R, Kitchen P (2010) Practitioners' perceptions of advertising strategies for digital media. Int J Advert 29:709–725
Tsai W, Ghoshal S (1998) Social capital and value creation: the role of intrafirm networks. Acad Manag J 41:464–476
Wirtz P (2011) The cognitive dimension of corporate governance in fast growing entrepreneurial firms. Eur Manag J 29:431–447
Wirtz JG, Zimbres TM (2018) A systematic analysis of research applying 'principles of dialogic communication' to organizational websites, blogs, and social media: implications for theory and practice. J Public Relat Res 30:5–34
Woodson-Boulton A (2012) Transformative beauty: art museums in industrial Britain. Stanford University Press, Stanford, CA
Xiao L, North D (2018) The role of technological business incubators in supporting business innovation in China: a case of regional adaptability? Entrep Reg Dev 30:29–57
Xiao L, Ramsden M (2016) Founder expertise, strategic choices, formation, and survival of high-tech smes in China: a resource-substitution approach. J Small Bus Manag 54:892–911

Chapter 4
Assessing the Maturity of Crowdfunding and Alternative Finance Markets

Karsten Wenzlaff, Ana Odorovic, Ronald Kleverlaan, and Tania Ziegler

Abstract In order to assess how public authorities and crowdfunding platforms can collabo-rate, it is essential to understand the different levels of maturity of the Crowdfunding ecosystem. The chapter analyses concepts developed in the crowdfunding literature. It establishes a unified framework to understand the increasing complexity of crowdfunding industries, by discussing the conceptual framework of Crowdfunding success. It proceeds to describe several models of maturity of industries by applying entrepreneurial ecosystem theory to the alternative finance space. Lastly, it transfers entrepreneurial ecosystem theory to the alternative finance regulation and the four scenarios of fitting crowdfunding and alternative finance into existing regulation.

Keywords Crowdfunding · Alternative finance · Regulation · FinTech · Maturity · Self regulation

4.1 Introduction, Motivation and Methodology

The European Union has introduced a new European Crowdfunding Service Provider Regime (European Commission 2018b; European Parliament 2019; European Union 2020) in 2020, which intends to harmonize regulatory frameworks in Europe and overcome existing fragmentation (Wenzlaff et al. 2020). The European

K. Wenzlaff (✉) · A. Odorovic
University of Hamburg, Hamburg, Germany
e-mail: karsten.wenzlaff@uni-hamburg.de; ana.odorovic@ile-graduateschool.de

R. Kleverlaan
Utrecht University, Utrecht, The Netherlands
e-mail: ronald@kleverlaan.com

T. Ziegler
University of Cambridge, Cambridge, UK
e-mail: t.ziegler@jbs.cam.ac.uk

R. Lenart-Gansiniec, J. Chen (eds.), *Crowdfunding in the Public Sector*,
Contributions to Finance and Accounting,
https://doi.org/10.1007/978-3-030-77841-5_4

Commission initiated a consultation process with stakeholders on the appropriate regime by publishing the impact assessment (European Commission 2018a). Both the market participants and the member states replied to the European Commission by cautioning that a harmonized regulatory framework might not be suitable for all member states (Wenzlaff and ikosom 2017).

The notion underlying this debate is of maturity of alternative finance ecosystems, in particular, the maturity of the crowdfunding ecosystem. Maturity in the context of crowdfunding is understood very differently by scholars. The maturity of crowdfunding ecosystems and the role of regulation in enabling the growth of the CF market has been discussed scarcely, even though that regulation of crowdfunding is a frequent topic in the literature.

Therefore, this chapter aims to develop a framework for maturity of crowdfunding ecosystems, with a particular emphasis on the regulatory framework for crowdfunding markets. The chapter contributes to research by comparing several methods on how to assess the maturity of ecosystems and crowdfunding ecosystems in general, and which factors enable a crowdfunding ecosystem to mature, with one crucial factor being the regulatory setting. The new framework features are more nuanced approach to the relationship between regulation and the crowdfunding ecosystem. A dichotomous approach of no regulation vs bespoke regime is abandoned by developing a four-stages model which also includes "stretch-to-fit" and "test-to-learn" approaches of regulators towards the platforms.

This chapter is intended as a starting point for debate, not as the conclusion of the debate. This debate will be enhanced in the future with more ample empirical evidence. The chapter is structured as follows: Section 4.2 reviews the literature on the determinants of success of alternative finance ecosystems. Section 4.3 discusses models for maturity of crowdfunding ecosystems. Section 4.4 discusses the development of regulatory frameworks in crowdfunding markets.

4.2 Success of Alternative Finance Ecosystems

The following section discusses various approaches to understanding the development of crowdfunding ecosystems. Ecosystem discussions are a frequent tool in management studies to elaborate on the changing dynamics of co-operation among competitors (Moore 1997; Iansiti and Levien 2004a, b). Analyses of ecosystems commonly identify the advantages of a multi-stakeholder development process through the lens of network theories and system theories.

The analysis of Entrepreneurial Ecosystems follows this line of thinking (Stam and Ven 2018; Acs et al. 2017). As one example out of many, Stam and van de Ven (2018) identify four framework conditions (Formal Institutions, Culture, Physical Infrastructure and Demand Conditions) and six systemic conditions (Networks, Intermediaries, Talent, Knowledge, Leadership, Finance) which all impact the output of an entrepreneurial ecosystem. Based on the analysis of the metrics of

these framework and systemic conditions, they develop an index to rank the promotion of entrepreneurial activity by the Dutch regions.

In their literature review, Cai et al. (2019) show that this approach, combined with theories of social capital, is also applicable in the crowdfunding literature. Kshetri (2015) is one of the earliest papers to analyze the effect of both formal and informal institutions on success of crowdfunding platforms (not individual projects). He outlines a research agenda, which unfortunately was not pursued in academic literature. He argues that a clear regulatory framework in equity-based crowdfunding reduces uncertainty and improves the success rate of crowdfunding platforms. Furthermore, countries with a more favorable entrepreneurial climate would treat equity-based crowdfunding more favorably. Authoritarian regimes, in contrast, do not allow the operation of crowdfunding platforms, because the increased competition threatens traditional financial institutions. He also proposes that attitudes towards online transactions have an impact on the success of crowdfunding platforms. Additionally, trust between strangers in a society allows crowdfunding platforms to grow quicker. Societies where welfare and charity elements are more common tend to be more supportive towards donation- and reward-based crowdfunding. Finally, self-regulation-mechanisms help crowdfunding platforms to avoid regulatory uncertainty and thus positively impact success of crowdfunding platforms.

In line with Kshetri, Rau (2017) used data from the Cambridge University Center Alternative Finance Benchmarking Studies to assess empirically the impact of formal and non-formal institutions on the development of alternative finance ecosystems. He finds that the rule of law, the quality of regulation, the control of corruption and ease of entry into the market are positively associated with the volume of crowdfunding markets, but he does not provide evidence for the hypothesis of Kshetri that social norms, which have an impact on trust within society, matters.

4.3 Models for the Maturity of Ecosystems

Management literature develops models to describe the maturity of ecosystems. For instance, Cukier and Kon (2018) introduce a model for the maturity of software startup ecosystems. Based on metrics such as available exit strategies, quality of accelerators, number of startups and angel funding, they develop a four-tiered model of software startup ecosystems. From Nascent ecosystem, via Evolving ecosystem and Mature ecosystem to Self-Sustainable ecosystem, the output efficiency and the resilience to external developments are used to define the maturity of software startup ecosystems. Cukier and Con then apply this maturity taxonomy to several startup ecosystems (Tel-Aviv, São Paulo, and New York). From their approach, it can be deduced that an effective method to develop a maturity model of ecosystems has the following components:

1. A list of organizations populating an ecosystem (businesses, business associations, governments, academic institutions, networks).
2. A list of interactions between these organizations (such as regulatory frameworks, self-regulation frameworks, business conducts, formal and informal interactions).
3. A list of metrics which measure the efficiency of an ecosystem, measuring the quality and quantity of interactions, resulting in a ranking of often geographical entities.
4. A clustering of geographical entities depending on their position in the ranking.

To address the first and second component in crowdfunding, it is instructive to refer to Gromek (2017, 2018). When discussing the digital ecosystem of crowdfunding, Gromek lists several characteristics of a well-functioning ecosystem and gives examples for each characteristic. These characteristics are as follows:

1. Cooperation between crowdfunding platforms and regulated intermediaries, such as banks and stock exchanges.
2. Existence of crowdfunding associations—Gromek refers to the Danish Crowdfunding Association, whose function has been taken over by the Nordic Crowdfunding Alliance.
3. Existence of self-regulation and codes of conducts adhered to by the platforms—Gromek refers to the Code of Conduct the UK Crowdfunding Association, which has also been formative for other Codes of Conduct in Europe (Odorović and Wenzlaff 2020).
4. Accelerator programs for crowdfunding platforms and/or projects/SMEs aiming to use crowdfunding to access finance, as well as business Environment Solutions providing coaching and support for crowdfunding campaigns—Gromek refers to the Accelerator program like the Crowdfunding Hub in the Netherlands (Kleverlaan and Wright 2017; Crowdfunding Hub 2015).
5. Public policies which support crowdfunding campaigns, such as tax incentives for investors in crowdfunding campaigns—Gromek refers to the EIS/SEIS Scheme in the United Kingdom (Vulkan et al. 2016; Hellmann et al. 2019; Ralcheva and Roosenboom 2016).
6. Independent academic analysis—Gromek refers to the Stockholm Fintech Report (Gromek 2018) and other examples of academic analysis of the sector.
7. An open dialogue between platforms and regulator and a regulator who has the mandate to expand the market—Gromek tells the story about the so-called Crowdfunding Fika, a monthly coffee-meeting of the Crowdfunding Industry in Sweden with the Swedish Regulator.

Although this list is seen through the lens of the Swedish crowdfunding ecosystem, it is instructive insofar as it mentions several stakeholders which are part of a mature ecosystem: Platforms and their associations, Project-Owners, Supporters and Investors, Policy Makers and Regulators, Banks, Stock Exchanges and other regulated financial intermediaries, and their associations, Academic Institutions.

Table 4.1 Maturity stages for crowdfunding ecosystems

Seed stage	Growth stage	Mature stage
Dominant type of CF		
Donation-based	Reward-based, emerging equity and lending-based	Equity- and lending-based
Role of international platforms		
International platforms dominate volumes, local platforms nascent	Local platforms compete with international platforms, are creating niche services	Local platforms are more successful than international platforms
Crowdfunding regulation		
No specific CF regime	CF regime incorporated in capital markets regime	Specific CF regime—Bespoke CF regime
Crowdfunding associations		
Very little informal dialogue between platforms	Informal network of platforms	Associations of platforms with self-regulation

It is possible to add several more stakeholders to this list. For instance, financial advisory services (regulated or not regulated) are also part of this ecosystem, which play an essential role building trust among market participants.

Gromek suggests a set of interactions which can foster the ecosystem, such as the regulatory framework, self-regulation frameworks of the industry, public support schemes, academic verification of data and trends, cooperation between non-regulated intermediaries and regulated intermediaries, dialogue between policymakers and industry representatives.

Building upon this model of stakeholders and their interactions, Wenzlaff (2019) proposes that Crowdfunding ecosystems across the globe are very different in their development and therefore need different policy frameworks for the development of their markets. Based on research by the Cambridge Center for Alternative Finance in Africa and Asia (Zhang et al. 2017; Garvey et al. 2017; ASEAN 2017), he develops a three-tier maturity model, with ecosystems transforming from the Seed State to the Growth Stage to the Mature Stage.

Wenzlaff proposes that each maturity stage can be identified by merely looking at the presence of Crowdfunding business models (Table 4.1). He suggests that Seed Stage crowdfunding ecosystems are dominated by donation-based Crowdfunding platforms, as those have the least regulatory burden. As crowdfunding ecosystems mature, reward-based, equity-based and lending-based crowdfunding platforms enter the market. With further development of the ecosystem, local platforms can now compete with the international platforms, because they are better equipped to deal with local regulation and self-regulation of the industry, which is introduced by crowdfunding associations forming at the mature stage of the industry.

Policymakers should adopt initiatives suited to each stage. He advises designating a central body within the government to promote the sector. This central body should be in charge of identifying best practices and industry data, not necessarily as a government function, but providing the budget to academia to generate data. This

body could also stimulate the interaction between the main stakeholders in the industry.

At the seed stage, according to Wenzlaff, the crowdfunding ecosystem can benefit from training, both of SMEs and Consultants. At the growth stage, governments should facilitate an open dialogue within the industry and regulators. The growth stage is also suitable for introducing co-financing schemes. Specific rules to regulate platforms and issuers are introduced at the mature stage. Wenzlaff advises building on existing regulatory regimes in order to make the local ecosystem compatible.

The three-tier model can be expanded easily. One could argue that after reaching the mature stage, crowdfunding services are integrated into the traditional financial systems. This "integrated stage" sees both new as well as traditional service providers using new digital technologies, such as crowdfunding platforms, but without the customer being able to distinguish between FinTechs and Banks, for instance.

Introducing a five-tier model for alternative finance, Kleverlaan (2016) proposes to distinguish ecosystems by specific indicators of maturity. He employs these indicators to develop an alternative finance maturity index (Kleverlaan and Wright 2017).

The first stage (Pre-Mature) is characterized by small platforms and mostly unregulated crowdfunding markets. The second stage (Expansion) sees first platforms to move beyond a crowdfunding volume of more than € 5 m in total. Like Wenzlaff (2019), he suggests that the maturity of an ecosystem increases when more alternative finance business models are offered by the platforms, which make use of the existing regulation. In response to the inadequate regulation, industry associations are formed that use self-regulation to guide the market. The third stage (Competition) sees platforms becoming sustainable and having a volume of more than € 50m in total. The third stage has the characteristic of having a specific Crowdfunding regulatory regime and wide-spread integration into the financial industry. Kleverlaan proposes that at the third stage, the alternative finance industry comprises up to 10% of the total finance market for a specific industry (e.g., SME business lending).

The final two tiers in the model of Kleverlaan relate to crowdfunding ecosystems which see a certain level of saturation. The fourth stage (Consolidation) displays mergers of platforms and the formation of separate associations along the lines of crowdfunding business models. Kleverlaan proposes that the fourth stage is characterized by a market share of at least 10%, at the most 20% of total SME funding. The final fifth stage (Mature Industry) is characterized by a market share of more than 20%. Kleverlaan proposes that at this stage, crowdfunding becomes an integral part of the financial industry.

Kleverlaan proposes that the transformation of the industry from one stage to the other is characterized by specific measures (Table 4.2). In the field of stakeholder education, he proposes to move from industry roundtables to formal certification of market participants. Similarly, in regulatory efforts, he proposes to move from open dialogue to a specific regulatory regime.

The three maturity taxonomies by Gromek, Wenzlaff and Kleverlaan have the central role of regulation in common. Given that the interaction between market

Table 4.2 Transformation of maturity stages

Stage	Regulation	Education
From pre-mature to expansion	Open dialogue	Industry roundtables Independent advisors
Expansion to competition	Clear regulation Public support	Collective promotion of success stories, regular publications of growth in the industry Training of advisors
From competition to consolidation	Investor protection Transparency on defaults	Independent academic research, certification of advisors, training and financial experts, governmental promotion
From consolidation to mature industry	Integrated completely into financial regulations	Formalized certification of financial experts, included in the curriculum of management and finance students

Table 4.3 Table of CF regulation

Outside the regulatory perimeter	Stretch to fit approach
Test-and-learn approach	Bespoke regime

participants and emerging regulatory frameworks have an enormous impact on the acceptance of new technologies in finance, it is no surprise that in all of the proposed models the stage of regulation is indicative of the stage of maturity of the whole system.

4.4 Maturity of Regulatory Frameworks

In the analysis of the Benchmarking reports, Odorović and Ziegler (Odorović et al. 2020) provide a more comprehensive framework for analyzing crowdfunding regulatory frameworks. Unlike the previous models, they propose two different paths from an unregulated crowdfunding ecosystem to a crowdfunding ecosystem with bespoke crowdfunding regulation (Table 4.3).

Odorović and Ziegler argue that crowdfunding platforms often escape regulatory oversight before crowdfunding becomes widespread or, in their view, poses a threat to financial stability. Until then, regulators embrace a "wait and see" strategy. For instance, in many markets, regulatory authorities do not classify equity-based crowdfunding platforms as investment brokerage firms to avoid placing a heavy burden on the platforms. This approach can also have adverse effects on the platforms, for instance when peer-to-peer lending requires a banking license, and therefore no platforms develop. If crowdfunding platforms and issuers fall outside the existing regulatory perimeter, crowdfunding platforms sometimes use self-regulation to fill gaps in the regulation, to protect the industry's reputation. For instance, Finance Estonia has created a self-regulatory system for crowdfunding—Estonia has the highest volume of crowdfunding per capita in Europe (Finance Estonia and Deloitte Legal Estonia 2016; Ziegler et al. 2019).

The second scenario entails the interpretation of existing rules developed for conventional financial models to target the risks arising from new models. This "stretch-to-fit" approach requires equity crowdfunding platforms to have a license as an investment firm. The problem with the stretch-to-fit-approach is that crowdfunding platforms have to bear the cost of compliance with rules which do not necessarily fit their business model. An example is the equity-based crowdfunding industry in Germany, which relies on subordinated loans and profit participation certificates as equity substitutes to escape the regulatory treatment of "transferable securities" and trigger prospectus requirements (Klöhn, Hornuf, and Schilling 2015).

The "test and learn" approach, in the third scenario, allows innovation to develop alongside the business models of crowdfunding platforms. This scenario uses three types of learning methods. Innovation offices are a way to engage regulators with industry members to understand technology solutions in the market. Regulatory sandboxes allow certain fintech providers to emerge, relying on a more lenient regulatory regime prior to formal licensing. SupTech are initiatives where the regulatory authority requests fintech firms to provide data, which allows regulators to supervise the market in real-time.

The last scenario is a Bespoke Regulatory Framework, which includes a set of regulatory rules tailored to the needs, capacities and risks of the crowdfunding business model. The risk of a bespoke regime is that a tailor-made system is adopted too early, leading to a regulatory failure and stifling market innovation. Several regulators in Europe have introduced quite different tailor-made systems for crowdfunding, leading to significant fragmentation of the European crowdfunding market.

The shift from one stage to another is far from universal across Europe. In some jurisdictions, regulators jumped straight to stage four, creating a bespoke regime way before the industry matured. The example is Italy, which introduced equity crowdfunding regulation back in 2013. Most jurisdictions experience stages two and four, firstly trying to fit crowdfunding models into the existing regulatory framework for traditional intermediaries. Once realizing that the existing rules do not fit the purpose of the newly emerging industry, they introduce bespoke regimes.

France is an illustrative example. The most cautious approach is to allow for the 'test-and-learn' stage, during which regulators closely monitor the risks of a few market players and experiment with a more lenient regime, which serves as a basis for adopting a tailored regulatory regime in the future. However, this approach is also very resource-intensive for the regulator, and as such, has limited application in less developed countries.

The added value of the model developed in this chapter is that it recognizes that regulatory frameworks and crowdfunding ecosystems do not move along a straightforward path of maturity. On the contrary, practice across European states features very different regulatory paths. Further empirical research is needed to assess their effect on the maturity of crowdfunding markets.

4.5 Conclusion

This chapter has outlined diverse approaches to maturity of crowdfunding ecosystems used in crowdfunding research. One of the cornerstones of different models is to discuss the development of both informal and formal institutions, in particular, crowdfunding-specific regulatory framework. It has shown that the existing research analyzing the effect of institutions on the success of crowdfunding markets fails to take into account divergent paths of development of crowdfunding regulation. Instead of a dichotomous approach to regulation—unregulated vs bespoke regimes, the paper developed a more nuanced model with four stages of crowdfunding regulatory frameworks, which can be used to study various ways in which policymakers approach the crowdfunding phenomena. The chapter highlights that regulatory frameworks evolve along different paths.

Several questions require further theoretical and empirical research. First, little is known how regulators and policymakers choose their regulatory path or policy options to support the crowdfunding ecosystem. In particular, it is essential to understand how rules and support schemes conceived for traditional intermediaries affect the speed of transformation of the crowdfunding platforms and the adopting of a bespoke regime. For instance, one could argue that the more inadequate the rules are, the faster is the shift from one stage to the next.

Another essential research question might refer to formal and informal interactions between different stakeholders and their influence on the shift between different stages. For instance, one could argue that the tradition of informal dialogue between regulators and platforms support a "test-and-learn" approach.

Furthermore, it is necessary to understand better how the size of the crowdfunding industry affects the regulatory path and the institutions surrounding the industry. The bigger the industry, the higher the pressure to tailor the rules to their needs, but one could also argue that some regulators might adopt a bespoke regime ex-ante to stimulate the growth of a nascent industry. The peer-to-peer lending regime in Lithuania, for instance, was specifically designed to allow domestic lending platforms grow quicker than their European counterparts.

An important question is whether going through all stages of (regulatory) maturity produces the best result in terms of helping the crowdfunding industry to develop fast. Skipping one or more stages might produce better results, adopting specific regimes and support mechanisms to early might result in stifling the industry. This has to be analyzed along different periods spent on each of the stages.

This chapter contributes to the debate on this topic by linking existing research on ecosystems and maturity to developments in the crowdfunding markets, supporting policymakers to determine at which stage their crowdfunding ecosystems are and how to find the appropriate regulation.

References

Acs ZJ, Stam E, Audretsch DB, O'Connor A (2017) The lineages of the entrepreneurial ecosystem approach. Small Bus Econ 49(1):1–10. https://doi.org/10.1007/s11187-017-9864-8

ASEAN (2017) Facilitating equity crowdfunding in the ASEAN region. ASEAN Secretariat, Jakarta

Cai W, Polzin F, Stam E (2019) Crowdfunding and social capital: a systematic literature review. In: SSRN scholarly paper ID 3361748. Social Science Research Network, Rochester, NY. https://papers.ssrn.com/abstract=3361748

Crowdfunding Hub (2015) CrowdfundingHub. http://www.crowdfundinghub.eu/

Cukier D, Kon F (2018) A maturity model for software startup ecosystems. J Innov Entrep 7(1):14. https://doi.org/10.1186/s13731-018-0091-6

European Commission (2018a) Impact assessment. Commission Staff Working Document. https://ec.europa.eu/info/sites/info/files/180308-proposal-crowdfunding-impact-assessment_en.pdf

European Commission (2018b) Proposal for a regulation of the european parliament and of the council on European Crowdfunding Service Providers (ECSP) for business. COM/2018/0113. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52018PC0113

European Parliament (2019) European Crowdfunding Service Providers (ECSP) for Business. 2018/0048(COD). https://oeil.secure.europarl.europa.eu/oeil/popups/ficheprocedure.do?lang=en&reference=2018/0048(COD)

European Union (2020) Regulation (EU) 2020/1503 of the European Parliament and of the Council of 7 October 2020 on European Crowdfunding Service Providers for Business, and Amending Regulation (EU) 2017/1129 and Directive (EU) 2019/1937 (Text with EEA Relevance). OJ L 347. http://data.europa.eu/eli/reg/2020/1503/oj/eng

Finance Estonia, and Deloitte Legal Estonia (2016) Finance Estonia - best practice for crowdfunding platforms. http://www.financeestonia.eu/wp-content/uploads/2016/02/Crowdfunding-Best-Practice.pdf

Garvey K, Ziegler T, Zhang B, Rau R, Gray M, Ridler S (2017) Crowdfunding in East Africa: regulation and policy for market development. University of Cambridge Alternative Finance Center, Cambridge, UK. https://www.jbs.cam.ac.uk/faculty-research/centres/alternative-finance/publications/crowdfunding-in-east-africa/

Gromek M (2017) Keynote - best practices building a National Crowdfunding Ecosystem. In: Presented at the Zagreb Crowdfunding Convention, Zagreb, October 11. https://www.slideshare.net/MichalGromek/keynote-best-practices-building-a-national-crowdfunding-ecosystem

Gromek M (2018) Stockholm Fintech Report. Stockholm School of Economics. https://www.hhs.se/contentassets/88eee8ea2b664a58bc652cb84aadded3/stockholmfintechreport2018v2.3.pdf

Hellmann T, Mostipan I, Vulkan N (2019) Be careful what you ask for: fundraising strategies in equity crowdfunding, 32

Iansiti M, Levien R (2004a) The keystone advantage: what the new dynamics of business ecosystems mean for strategy, innovation, and sustainability. Harvard Business School Press, Boston, MA

Iansiti M, Levien R (2004b) Strategy as ecology. Harv Bus Rev (March 2004). https://info.psu.edu.sa/psu/fnm/asalleh/IansitiLivienStrategyAsEcology.pdf

Kleverlaan R (2016) Expanding the crowdfunding market in SE Europe. http://www.bi.undp.org/content/dam/croatia/docs/Research%20and%20publications/environment/Expanding%20the%20Crowdfunding%20Market%20in%20SE%20Europe%20-%20Ronald%20Kleverlaan.pdf

Kleverlaan R, Wright T (2017) Current state of crowdfunding in Europe. CrowdfundHub, Amsterdam. https://www.sbs.ox.ac.uk/sites/default/files/Entrepreneurship_Centre/Docs/OxEPR2/current-state-crowdfunding-europe-2016.pdf

Klöhn L, Hornuf L, Schilling T (2015) The regulation of crowdfunding in the German small investor protection act: content, consequences, critique, suggestions. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2595773

Kshetri N (2015) Success of crowd-based online technology in fundraising: an institutional perspective. J Int Manag 21(2):100–116. https://doi.org/10.1016/j.intman.2015.03.004

Moore JF (1997) The death of competition: leadership and strategy in the age of business ecosystems, 1st edn. Harper Business, New York

Odorović A, Wenzlaff K (2020) The joint production of confidence – self-regulation in European crowdfunding markets. Balt J Manag 15(2):303–331. https://doi.org/10.1108/BJM-04-2019-0119

Odorović A, McKain G, Garvey K, Schizas E, Zhang BZ, Rowan P, Ziegler T (2020) FinTech innovation in the Western Balkans: policy and regulatory implications and potential interventions. Available at SSRN 3619214

Ralcheva A, Roosenboom P (2016) On the road to success in equity crowdfunding. SSRN Electron J. https://doi.org/10.2139/ssrn.2727742

Rau PR (2017) Law, trust, and the development of crowdfunding. SSRN Electron J. https://doi.org/10.2139/ssrn.2989056

Stam FC, van de Ven A (2018) Entrepreneurial ecosystems : a systems perspective. Working papers 18–06. Utrecht School of Economics. https://ideas.repec.org/p/use/tkiwps/1806.html

Vulkan N, Åstebro T, Sierra MF (2016) Equity crowdfunding: a new phenomena. J Bus Ventur Insights 5(June):37–49. https://doi.org/10.1016/j.jbvi.2016.02.001

Wenzlaff K (2019) Developing a policy framework for emerging crowdfunding ecosystems. ORF Policy Briefs, no. 302, 12

Wenzlaff K, Institut für Kommunikation in sozialen Medien ikosom (2017) Response to impact assessment - legislative proposal for an EU Framework on Crowd and Peer to Peer Finance. https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2017-5288649/feedback/F7887_en?p_id=124034

Wenzlaff K, Odorović A, Ziegler T, Shneor R (2020) Crowdfunding in Europe: between fragmentation and harmonization. In: Shneor R, Liang Z, Flåten B-T (eds) Advances in crowdfunding: research and practice. Springer, Cham, pp 373–390. https://doi.org/10.1007/978-3-030-46309-0_16

Zhang B, Wardrop R, Collings S, Ziegler T, Hileman G, Rau R, Burton J et al (2017) 'Africa and Middle East'. 1. Africa and Middle East alternative finance benchmarking report. University of Cambridge Alternative Finance Center, Cambridge, UK. https://www.jbs.cam.ac.uk/faculty-research/centres/alternative-finance/publications/africa-middle-east/

Ziegler T, Shneor R, Wenzlaff K, Odorović A, Johanson D, Hao R, Ryll L (2019) 'Shifting paradigms - the fourth European alternative finance benchmarking report'. 4. Cambridge Centre for Alternative Finance. https://www.jbs.cam.ac.uk/faculty-research/centres/alternative-finance/publications/shifting-paradigms/

Chapter 5
From Passive Observer to Confident Leader: Taxonomies for Public-Private Collaboration in Regional and Local Civic Crowdfunding

Karsten Wenzlaff

Abstract The interaction of public authorities with private crowdfunding platforms is an important building stone in creating a mature Crowdfunding ecosystem (Wenzlaff, Civic Crowdfunding – Finanzierung von Öffentlichen Gütern. In: Crowd entrepreneurship: Das Gründungsgeschehen Im Wandel, 2019). Especially during a global crisis like the Covid-19 pandemic, the collaboration of these two groups of stakeholders is in high demand by the platforms (Ziegler et al., Global COVID-19 FinTech market rapid assessment study - CCAF publications. University of Cambridge Alternative Finance Center, 2020b) as well as public authorities (Rowan et al., Global COVID-19 FinTech Regulatory Rapid Assessment Study - CCAF Publications. University of Cambridge Alternative Finance Center, 2020). The following article classifies examples of public authorities working together with Crowdfunding platforms all over Europe. It discusses two theoretical frameworks, developed by Rodrigo Davies (Civic crowdfunding: participatory communities, entrepreneurs and the political economy of place. Master Thesis, Massachusetts Institute of Technology, 2014; Understanding the crowd, following the community: the need for better data in community development crowdfunding. Federal Reserve Bank of San Francisco, 2015a; Inf Commun Soc 18 (3):342–55, 2015b) and Hannah Griffiths (Future Cities Catapult and Griffiths, Civic crowdfunding a guidebook for local authorities. Future Cities Catapult, UK, 2017). The chapter then proceeds to expand the theoretical framework developed by Griffiths. In addition, the chapter contributes to academic research by providing a representative list of examples of collaborations of crowd-funding platforms with public authorities.

Keywords Regional crowdfunding · Civic crowdfunding · Public authority

K. Wenzlaff (✉)
University of Hamburg, Hamburg, Germany
e-mail: karsten.wenzlaff@uni-hamburg.de

R. Lenart-Gansiniec, J. Chen (eds.), *Crowdfunding in the Public Sector*,
Contributions to Finance and Accounting,
https://doi.org/10.1007/978-3-030-77841-5_5

5.1 Civic Crowdfunding and the Public Good

Crowdfunding, the collaborative financing of entrepreneurial activity, is a market that cumulatively surpasses the one-trillion-dollar threshold in 2020 (Ziegler et al. 2020a). Unsurprisingly, the growth of this market is a focus of policy makers across the globe, not just with regards to regulating this market, but also with regards to making the benefits of this form of alternative finance accessible to public authorities by leveraging public spending through private investors.

The specific modes of interaction between public authorities and crowdfunding platforms are a nascent topic of scientific inquiry but have been touched upon by a wide range of academic and practitioners' literature covering the phenomenon of 'civic crowdfunding'(Wenzlaff 2020b). Civic crowdfunding research aims to explain how crowdfunding can generate a 'public good', a good which is non-excludable and non-rivalrous (Samuelson 1954).

An early, and very narrow, definition of Civic Crowdfunding defines the phenomenon as "the subset of Crowdfunding campaigns which aim to finance a civic cause. A civic cause is a cause which improves public infrastructure [. . .]" (Wenzlaff 2016). Crowdfunding a street, bridge, playground or public park would fall within that narrow definition of civic crowdfunding.

The academic literature in recent years has constantly evolved from this very early definition (Wenzlaff 2020a). What is Civic Crowdfunding and how is the concept of Civic Crowdfunding related to regional and local crowdfunding? It is beyond the scope of this chapter to re-tell the different narratives used in academia. Four dimensions of the definition of Civic Crowdfunding have been identified in the academic literature (Wenzlaff 2020b), and the chapter proceeds by tying these four perspectives to the term "local crowdfunding".

5.2 Local Crowdfunding and Civic Crowdfunding

"Local crowdfunding" is used somewhat synonymously to two other closely related terms: "regional crowdfunding" and "municipality crowdfunding" (in German: "kommunales Crowdfunding) (Kukla 2014; Wenzlaff et al. 2015; Hainzer et al. 2014; Zoellig 2017; Assenmacher 2017; Ackermann et al. 2019).

The literature on this specific form crowdfunding refers to the place-based nature of crowdfunding, exploring a notion developed by Rodrigo Davies (2014) that crowdfunding is overwhelmingly a local phenomenon, with most crowdfunding originating from the same community of supporters which are targeted during the campaign. This place-based nature of crowdfunding is part of the success of crowdfunding (Boyle 2016; Mayer 2018; Foà 2019; Old et al. 2019; Brent and Lorah 2019; Dejean 2019), since it allows the existence of social capital within a group to have an impact on the potential real capital mobilized by the crowdfunding campaign.

Table 5.1 Local vs civic crowdfunding

	Civic crowdfunding	Civic and local crowdfunding	Local crowdfunding
Project Goal	Public Good *"Clean Nature"*	Local Public Good *"Park"*	Local Good *"Private Concert"*
Project Owner	Public Authority *"National Government"*	Local Public Authority *"City Council"*	Local Project Owner *"Local Enterprise"*
Project Supporter			Local Project Supporter *"Citizen"*
Platform	Platform operated by Public Authority *"National Crowdfunding Platform for Clean Nature"*	Platform operated by Local Public Authority *"Regional Crowdfunding Platform for Circular Economy"*	Platform operated by Local Enterprise *"Local Crowdfunding Platform for City X"*

Adapting the four perspectives of "Civic Crowdfunding" (Wenzlaff 2020b), which are further explained in Table 5.1, is necessary before proceeding in this chapter.

The first perspective refers to the project goal. "Local crowdfunding" in that sense can be understood in the narrow sense of creating a public good (or semi-public good) for a local audience. "Local crowdfunding" can also be understood in the sense that it creates a private local good. This dichotomy is best explained through an example. Crowdfunding a public park results in a local public good. Crowdfunding a local concert results in a local private good, because access to the good is excludable. It is important to note that local private goods can have local public good spillovers, for instance crowdfunding a local concert can boost the 'creative image' of city.

Regarding the second and third perspective, a similar dichotomy is evident. In the literature on civic crowdfunding, a civic authority can be acting as both the project owner and the project supporter within a crowdfunding campaign. In local crowdfunding, a local enterprise can function as project owner, which is supported by a local citizen during the campaign. In local civic crowdfunding, a local public authority can act either as a project owner, or a project supporter—the other side then being taken by either a local enterprise or a local citizen.

Fourthly, civic crowdfunding is defined through the platform perspective. In the case of a public authority operating a platform, academic research puts these activities within the scope of civic crowdfunding, sometimes if the platforms operated by the public authority serves a civic goal (Bone and Baeck 2016; Old et al. 2019), sometimes arguing that non-civic causes such as promoting specific entrepreneurial ventures (Wenzlaff 2017) can also be considered part of civic crowdfunding. A local crowdfunding platform would simply be a platform which only accepts projects from a specific region or territory within a nation-state. A local

civic crowdfunding platform[1] would be a platform which is connected to a specific region and operated by a local public authority.

5.3 A Wide Definition of Public Authority

The last item to define is the term public authority. The starting point for defining public authority is identifying a similar term which as a specific meaning in European cohesion politics. In the European Union cohesion policy, a "managing authority" is clearly defined as "*a national ministry, a regional authority, a local council, or another public or private body that has been nominated and approved by a Member State*" (European Commission 2014a) which in the framework of the European Cohesion Policy (European Union 2013; European Commission 2018c) "*provides information on the [structural investment] program, selects projects and monitors implementation*" (European Commission 2014b).

For the analysis in the next section, such a definition is too narrow. When the author of this chapter published a first overview of the examples listed below on LinkedIn (Wenzlaff et al. 2020a), it was evident that very few of the so-called managing authorities had actively been collaborating with crowdfunding platforms. The reason is simple: often the ministries in charge of implementing the structural investment programs are tasked with regional development, whereas the ministries collaborating with crowdfunding platforms are either finance ministries or ministries for business development and commerce.

The most sensible way to collect the examples below has been to use a wide definition of public authority. Authority is understood in the Weberian sense of legal-rational authority (Weber 2019) as institutional power, governed by legal norms. Therefore, in the context of this chapter, "public authority" is understood as being wielded by a wide range of possible institutions:

> A national, regional or local government, a ministry within the government, a government agency (like a Financial Market Supervision agency, or a Business Innovation agency); [a] municipality, province or cluster of boroughs, districts or cities; [a] bank, which is owned by a public entity, for instance to create incentives for investments in SMEs or Start-Ups; [a] foundation set-up by a public entity, for instance to allow the management of public parks or education institutions. (Wenzlaff et al. 2020a)

An advantage of having a wide-ranging definition of public authority is that it allows sampling more example. However, the wide range of definition is not just for convenience of data gathering. It is also justified by the fact that public authorities tend to outsource the interaction with crowdfunding platforms to agencies within their domain, such as business support agencies or public business incubators.

[1]The term "Kommunales Crowdfunding" (Municipal Crowdfunding) refers to this type of combination of both local and civic crowdfunding (Hainzer et al. 2014; Assenmacher 2017; Ackermann et al. 2019).

One example is the case of Wir-bewegen.sh, a crowdfunding platform hosted by the Business Bank of the government of Schleswig-Holstein. Instead of hosting the platform at the Ministry of Finance, or the Ministry for Regional Development, the business bank, which is owned by the regional government, receives an annual budget of 100.000 Euro to support the activities of the crowdfunding platform (Investitionsbank Schleswig Holstein 2015a).

One of the reasons for this particular noteworthy outsourcing is accountability, meaning that the delegated agencies have less strict oversight and therefore can do more "experiments" with new innovative forms of financing.

A second reason is that business support agencies and incubators are facing enterprises, especially small and medium-sized enterprises (SMEs) and therefore already have exposure to the target group of the collaboration with the crowdfunding platform.

A third reason is that the interaction with crowdfunding platforms involve a steep learning curve where public authorities have to learn and how to steer, govern and supervise the collaboration.

5.4 Collaboration for the Private Good

Public authorities and crowdfunding platforms do not only interact to create public goods, but also join forces to create semi-public goods and private goods. For instance, public authorities collaborate with crowdfunding platforms to promote entrepreneurial activity. The example of the equity-based Crowdfunding platform Aescuvest.eu is highlighted below, which through a collaboration with EIT Health and funding from the European Commission has created the first pan-European Crowdfunding platform for Health-Techs (Brandkamp and Zillikens 2017; Aescuvest 2019, 2020). The aim of this collaboration is to support the growth of Health-Tech-startups, creating patented medical innovations and private profits for the investors—which could be considered the exact opposite of a 'public good'.

In the case of Aescuvest.eu, the public authorities financially support the management of the platform, thereby reducing the costs of investments for the investors, and at the same time, reducing the costs of access to finance for the startups. While the growth of entrepreneurial ecosystem creates public-good-like spill-overs such as a competitive context for innovation (Stam and Spigel 2016; Stam and van de Ven 2018), the primary impact of the example above is supporting private investors.

It is, therefore, prudent to ask why public authorities collaborate (or should collaborate) with platforms towards increasing individual profit and wealth, thus cementing economic disparity—a question that has been raised repeatedly in academic literature on Civic Crowdfunding as well (Davies 2015b; Desmoulins and Charbit 2017).

5.4.1 The Policy Case for Promoting Collaboration

The European Commission, in its effort to design a harmonized framework for Crowdfunding in Europe (European Commission 2018a, b; European Union 2020), has repeatedly pointed to the positive impact of Crowdfunding on the financial markets as a whole, thus evoking the maturity of financial markets as a public good. The argument, brought forward repeatedly, is that crowdfunding can increase access to finance, transparency of financial markets, portfolio diversification of retail investors, and thus financial stability (Gajda et al. 2012). Therefore, one could argue, is that the services of crowdfunding provide a public good, regardless if the individual campaigns on the platform are generating private goods.

The role of platforms is central to this (perceived) positive impact. As an intermediary between the investors and the project owners, platforms have to balance the interests of both sides (Günther and Riethmüller 2020; Odorović and Wenzlaff 2020). Therefore, the policy debate in Europe is increasingly concerned with analyzing and developing frameworks of interaction between the platforms on the hand, and public authorities on the other hand.

The debate is partially motivated by the precarious business models of crowdfunding platforms. Crowdfunding platforms rely mostly on success-based fees, which often do not adequately cover the costs of operating a platform. This is especially relevant in Eastern, Southern and Central Europe where donation-based and reward-based crowdfunding models are dominant (CrowdfundPort 2016; Ziegler et al. 2019, 2020a). The collaboration of public authorities and private platforms serves to stabilizes the business model of platforms, which the harmonization of the European regulatory framework had no intention to achieve (Wenzlaff and ikosom 2017).

5.4.2 European Structural and Investment Funds in Combination with Crowdfunding

One particular motivation of policy makers is to combine public funds, awarded by the European Union through European Structural and Investment Funds (ESIF), with private money. Through the use of financial instruments, such as loans, loan guarantees, and equity (European Commission, European Investment Bank, and fiCompass 2019; European Crowdfunding Network 2019), the aim is to increase the volume of co-financing through crowdfunding platforms significantly.[2]

European Structural Investment Funds, and specifically European Regional Development Funds (ERDF) are most relevant for regions which are on the

[2]The European Commission is expected to publish recommendations on the implementation of ESIF by managing authorities in 2021 (European Commission and DG Regio 2020; European Commission et al. 2021).

periphery of economic development (European Commission and DG Regio 2021). The hope of combining crowdfunding and European funds in these regions is to boost economic growth and contribute to social cohesion in Europe (Müllerleile et al. 2014).

The challenge for achieving this ambitious goal is the unequal distribution of crowdfunding activity across Europe (Ziegler et al. 2019; Wenzlaff et al. 2020b):

- Crowdfunding Volumes are predominantly focused on Western Europe, therefore increasing the likelihood of measures taken by the European Commission to improving.
- Transnational platform activity originates mostly from Western, Northern and Baltic Europe.
- Countries with lower levels of GDP per capita are dominated by donation- and reward-based crowdfunding, which exhibits lower total Crowdfunding volumes, lower Crowdfunding volumes per investor and lower Crowdfunding volumes per project.

The examples listed in this chapter, confirm these patterns, as they show the eagerness of public authorities from 'rich regions' to collaborate with crowdfunding platforms: London, Utrecht, Munich, Milan, Barcelona and Stockholm, to name a few examples of municipalities discussed below.

5.4.3 Taxonomies of Collaboration 1: The Davies-Model and the Davies-2.0-Model

Challenging for analysts of civic crowdfunding researchers is the fact that the phenomenon puts the public authority in three places at once: the project owner receiving the fund, the project supporter of co-funding parts of the campaign, and the platform owner operating the crowdfunding platform (Wenzlaff 2020a, b). To capture the diverse set-up of a public authority, most researchers rely on a model developed by Rodrigo Davies (2014, 2015a, b), which will be henceforth called the Davies Model.

The Davies Model outlines four different models of engagement: Promoter, Curator, Facilitator and Platform (Davies 2014, p. 140). In Davies' terminology, the promoter acts a fundraiser (project owner), the curator selects projects and supports them with marketing, the facilitator provides training and expertise to the crowdfunding projects, and finally the platform hosts the crowdfunding campaigns. These four models are positioned next to each other, almost as if a public authority could choose freely between them.

The Davies Model has been expanded in (both academic and practitioners') literature (Bone and Baeck 2016; CrowdfundPort 2017; Bonini and Pais 2017; Desmoulins and Charbit 2017; Passeri 2017; European Crowdfunding Network and Passeri 2018; Pacchi and Pais 2020), and therefore as an overview, Table 5.2

Table 5.2 The Davies 2.0 model of interaction

Role	Definition
Owner	The public authority initiates crowdfunding campaign. The raised money is received by the public authority directly or indirectly through an institution which is owned by the public authority.
Promoter/ sponsor	The public authority collaborates with an existing platform and supports the campaigns on the platform through co-funding or prizemoney. The raised money goes to the project owners, which can be citizens or enterprises.
Curator	The public authority collaborates with an existing platform by selecting projects which are then supported with marketing, co-funding or prizemoney. The raised money goes to the project owners, which can be citizens or enterprises. A curator can also function through the operation of a meta-platform, which does not include the transfer of payments, but simply the display of campaigns.
Facilitator	The public authority supports crowdfunding campaigns by providing or paying for technical capacity training, workshops and knowledge building.
Selling-service	The public authority supports a crowdfunding campaign by providing additional services to the project supporters or the project owners. A possible service could be carrying out validation and verification of information provided by the campaign owners.
Platform/ Manager	The public authority hosts and operates its own crowdfunding platform. The raised money goes to the project owners, which can be citizens or enterprises.

outlines a more extended overview of the different roles which a public authority can assume. As Table 5.2 shows, the six different roles generate some overlap in their descriptions. However, the most important drawback of this model is that it does not guide a public authority on the appropriate model of crowdfunding collaboration.

5.4.4 Taxonomies of Collaboration 2: The Griffith-Model

To tackle some of the shortcoming of the Davies-Model, it might be helpful to examine the model proposed in the Civic Crowdfunding Guidebook for Local Authorities, which was developed by Hannah Griffith (Future Cities Catapult and Griffiths 2017). Henceforth, this model will be called the Griffith-Model. The Guidebook was written for the Manchester City Council in 2017 by the Think-Tank Future Cities Catapult, and it distinguishes itself from many other guidebooks in civic crowdfunding by proposing a sequence of interaction public authority and crowdfunding platform.

Sequential interaction is proposed along higher integration between public authority and crowdfunding platform, essentially meaning that the public authority takes over roles of the platform and vice versa. The level of integration as a unit of analysis has already been proposed in the Davies Model (Davies 2014, p. 133), in that case along two dimensions. The first of the two so-called "civic crowdfunding integrity dimension" is the share of public ownership of the campaign, the second dimension is the share of public support to a campaign.

In the Griffith Model the integration is sequenced along the dimension of benefit and challenges. The Griffith Model contains four steps: the passive observer, the active supporter, the catalyzer of activity and the confident leader (Future Cities Catapult and Griffiths 2017, pp. 25, 28, 36, 40).

The four steps of the Griffith Models are as follows: Firstly, a public authority is not aware of civic crowdfunding activities in its area. Once they are approached by local service providers and crowdfunding platforms, they enter the second stage: the active supporter. On this second stage, they establish digital presences on the platforms. By offering match-funding services, they become the catalyzer of activity, which is the third step in the Griffith model. The fourth step is characterized by the fact when the collaboration with crowdfunding platforms pays off and the public authority wants to scale its activities. Then it has reached the stage of a confident leader (Future Cities Catapult and Griffiths 2017).

5.4.5 Taxonomies of Collaboration 3: The Griffith-2.0-Model

The Griffith Model connects the benefits of an increasing integration of the public authority with the crowdfunding platform to the risks associated with the integration. However, higher risks are also associated with larger impact of the collaboration. "[T]he phase a local authority reaches is largely dependent on their appetite for risk and the level of commitment they can make, both monetarily and in terms of resource effort. In return for a heightened risk appetite and increased level of commitment, the resultant impacts are typically larger and are enjoyed more widely across the local area." (Future Cities Catapult and Griffiths 2017, p. 29). Based on the Griffith Model, a Griffith 2.0 model which integrates aspects from the Davies 2.0 model, is shown in Table 5.3.

The difference between the Griffith Model and the Griffith 2.0 model is the clear distinction between each stage.

The passive observer on the first stage morphs into an active supporter on the second stage by becoming visible, especially by providing non-financial support.

Table 5.3 The Griffith 2.0 model of interaction'

Role	Definition
(passive) Observer	A public authority observes how crowdfunding platforms operate and select campaigns and draws inference from the outcome of crowdfunding campaigns.
(active) Supporter	A public authority provides non-financial support, for instance through increasing technical capacity of platforms, guidance to project supporters and training of project owners.
(enthusiastic) Catalyzer	A public authority supports either the project, the supporter or the platform financially, but is not part of the campaign itself.
(confident) Leader	A public authority becomes part of the crowdfunding campaign by either participating as a platform, a project owner or a project supporter.

Table 5.4 Impact benefits and challenges

Role	(Internal) operation	(External) reputation
Observer (Low integration with platform, low legal risk)	Benefit: Identifying needs of citizens and enterprises Challenge: Identifying the right platform for collaboration	Since this role involves no external communication, there are no benefits and challenges.
Supporter (Medium-low integration with platform, medium-low legal risk)	Benefit: Supporting the maturity of the Crowdfunding ecosystem Challenge: Identifying the right business model of Crowdfunding to support	Benefit: More trust in Crowdfunding and its stakeholders Challenge: Reputation Liability from failed campaigns or platforms
Catalyzer (Medium-high integration with platform, medium-high legal risk)	Benefit: Supporting projects which align with policy priorities Challenge: Selecting the appropriate projects for support, legal challenges related to state-aid	Benefit: Using the media outreach of campaigns to display public priorities Challenge: Reputation Liability from failed project implementation after the campaign.
Leader (High integration with platform, high legal risk)	Benefit: Leveraging private money through investments in crowdfunding ecosystem Challenge: Legal risks from operating a platform, acting as project supporter or project owner	Benefit: Increase the visibility of public spending Challenge: Increased demand for public accountability and transparency

The active supporter transforms into an enthusiastic catalyzer by providing financial support to either the platform, the project or the support, thus entering the third stage. The enthusiastic catalyzer reaches the fourth stage and is henceforth the confident leader by joining the crowdfunding process as one of the three stakeholders in the crowdfunding process.

Five advantages of the Griffith 2.0 model over the Davies 2.0 model can be examined:

Firstly, it acknowledges that the public authority can benefit from the crowdfunding ecosystem even by passively observing the outcomes of the crowdfunding campaigns in its territory. The campaigns indicate the desires of citizens, the clusters of innovation of enterprises, and the communication channels to bring both stakeholder sides together, all of which are helpful items of knowledge for public authorities.

Secondly, it allows to use the model to display benefits and challenges which are connected to the model. Some selected benefits and challenges are displayed in Table 5.4, but discussing them in detail is beyond the scope of this chapter.

Thirdly, it allows to the use the model to gauge the potential legal challenges for the public authority. Some legal challenges are listed in Table 5.4, but it should be noted that the clear impetus of this model is to align increased legal risk with increasing potential impact.

Fourthly, it shows a clear learning curve for the public authorities. Public authorities can start by simply observing the crowdfunding ecosystem. They can then proceed with technical capacity building, followed by supporting the ecosystem through financial transactions and finally becoming part of the crowdfunding ecosystem.

Fifthly, the roles in Davies 2.0 can be easily integrated in Griffith 2.0. The roles 'facilitator' and 'selling-service' would be part of the 'supporter'-role. The 'curator' and the 'promoter' would be part of the 'catalyzer'-role. Finally, the roles of 'owner' and 'manager' would be part of the 'leader'-role.

The Griffith 2.0 model will now be used to analyze some examples of collaboration between crowdfunding platform and public authority. It is argued that the Griffith 2.0 model has advantages over the Davies 2.0 model because it adequately captures the evolution in a public-private collaboration in crowdfunding.

The list of examples tries to serve the same research as a multiple case study (Stewart 2012). Through desk-research, the examples were identified and categorized. Then through LinkedIn-interviews, emails and personal interviews, the examples were validated and verified.[3] The scope of this chapter is too narrow to include additional data which has been collected, such as the number of projects or the total volume of alternative finance raised. The purpose of this chapter is simply to list some possible illustrative case-studies that were found in the research.

The focus of these case studies is on European collaborations between public authorities and crowdfunding platforms. There are many more examples found overseas, but for the brevity of this chapter, the author is of the opinion that the European examples are already quite illustrative.

5.5 Examples

5.5.1 The Passive Observer

Since the passive observer involves a public authority to be merely analyzing the emerging crowdfunding ecosystem, it is challenging to find examples of public authorities which report about this active passivism.

- **Place2Help München (Reward, Germany):** Place2Help was a private initiative based in Munich, which created a local crowdfunding platform. The platform was

[3]Some of the examples have been published in extended form for review by the crowdfunding community on LinkedIn (Wenzlaff et al. 2020a).

supported by a local commercial bank and a local IT company. It allowed the city of Munich to understand the importance of the ecosystem (muenchen.de. 2015)
- **LeihDeinerStadtGeld (Equity, Germany):** The German Lending Platform LeihDeinerStadtGeld facilitated a loan for firefighter equipment in the city of Oestrich-Winkel. Although the city was not involved directly, it was able to benefit from the market test of promoting a civic loan to the citizen (LeihDeinerStadtGeld GmbH 2012).

5.5.2 The Active Supporter

A public authority which supports crowdfunding platforms, investors and projects through non-financial support is an active supporter.

- **Accio Recomanador de finançament alternatiu (Equity, Spain)**: The province of Catalonia through its Business Competitiveness Agency created an online-tool to compare Alternative Finance providers, for instance Crowdfunding Platforms (ACCIÓ - Agència per la Competitivitat de l'Empresa 2013)
- **Citizenergy (Equity, Portugal)**: Citizenergy curates crowdfunding projects which focus on energy efficiency. The meta-platform was funded through the Intelligent Energy Program of the European Union and hosted by the Portuguese Energy Cooperative Boa Energia (Citizenergy 2015).
- **Crowdfunding-Berlin (Donation, Reward, Equity, Germany):** The city of Berlin supported the development of the regional crowdfunding ecosystem by creating a meta-platform which made it possible potential investors to search Berlin-based projects from a range of platforms. The meta-platform also listed crowdfunding experts (Creative City Berlin 2018).

5.5.3 The Enthusiastic Catalyst

Funding the project owner to the supporter while the campaign is active is classified as enthusiastic catalyst.

- **Aescuvest.eu (Equity, Germany):** The German HealthTech platform Aescuvest. received a grant from EIT Health. EIT is the European counterpart to the American MIT, and EIT Health is its healthcare network. The grant was created to launch a European wide Crowdfunding platform (Aescuvest 2019).
- **Crowdculture (Reward, Sweden):** Crowdculture was one of the first platforms in Europe to implement a co-funding scheme. The Fund of Innovative Culture financed the platform development. The fund is part of the City of Stockholm. Innova, the Swedish Innovation Agency of the Swedish government, also financed the platform and the co-funding activities. Supporters can match-fund Sweden's cultural budget (Edlund 2013; Crowdculture 2013).

- **Crowdfunding Förderung Graz (Reward, Austria):** The preparation of a crowdfunding campaign by any company based in Graz is supported through the city budget. The campaign can use the money to prepare the pitch-video or procure other creative industry services (Graz-Präsidialabteilung 2016a; b).
- **Make London (Reward, United Kingdom).** The City of London has collaborated with the platform SpaceHive since 2014 on several co-funding rounds. The latest collaboration "Make London" commits up to 5000 GBP for small projects, and up to 50.000 GBP for large projects in co-funding (Spacehive 2017, 2019; London City Hall 2020).
- **Smart City Milan Crowdfunding (Reward, Italy):** The city of Milan co-funded projects with a positive social impact. With the crowdfunding platforms Eppela, Produzioni Dal Basso and Ginger, several calls have been implemented. The co-funding was 50% (Eppela 2018; Produzioni Dal Basso 2019; Ginger 2021).
- **Split-Dalmatia Crowdfunding (Reward, Croatia):** RERA S.D. for Coordination and Development of Split-Dalmatia County supports crowdfunding campaign with a 30% co-funding (ICFC 2020).
- **Trine & Side (Equity, Sweden):** The Swedish Development Agency (SIDA) initiated a risk-sharing agreement the Swedish energy crowdfunding platform Trine, which leveraged the investment amount for renewable energy projects in Africa (Trine 2018; SIDA 2020).
- **Voor Je Stadsie (Reward, Netherlands):** The City of Utrecht and Civic Crowdfunding Platform VoorjeBuurt collaborate on the joint platform, with VoorjeBuurt operating and hosting the platform. The City of Utrecht paid the preparation of campaigns (Voorjebuurt 2018).

5.5.4 The Confident Leader

The confident leader is a public authority which participates in the crowdfunding process by either operating a platform, becoming a project owner or becoming a project supporter.

- **Avietė (Lending, Lithuania)**: INVEGA, the Lithuanian National Promotional Institution, set up Avietė as a loan-instrument in cooperation with FinBee, a lending-based crowdfunding platform operating in Lithuania. Invega became a lender through the platform (INVEGA 2020; Kaišiadorys tourism and business center 2020).
- **CCS and Finora (Lending, Estonia)**: Through the Cultural and Creative Sectors Guarantee Facility (CCS), which is part of the Creative Europe program (2014–2020), a loan guarantee was provided to Finora Capital, an Estonian balance-sheet business lender. The loan guarantee allows the loans to be distributed at better conditions (Finora Capital 2020; European Commission 2020).
- **Passo per San Luca (Donation, Italy):** The Municipality of Bologna used crowdfunding to renovate the San Luca Gate, a historical monument. With the

platform Ginger, the campaign raised 339.000 Euros, an additional 200.000 were implemented by the city of Bologna (Donati 2014).

- **Private Credit for SMES (Lending, France)**: The European Investment Fund (EIF) distributed through the "Private Credit Tailored for SMEs" program 100m EUR in loans to SMEs in Europe. The platform October was the partner for the EIF (EIF 2019; October 2020).
- **We4 Tourism (Equity, Austria):** The platform We4Tourism is operated by the Austrian Tourism Bank, which is charged by the Austrian Federal Ministry for Sustainability and Tourism to finance tourism projects. On the platform, retail-investors can fund tourism ventures (Conda and Österreichische Hotel und Tourismus Bank 2016).
- **Wir-bewegen.sh (Donation, Germany)**: The platform is owned indirectly by the German region Schleswig-Holstein through its business bank, the Investitionsbank Schleswig-Holstein. The platform has a strong collaboration local saving banks, and regional associations, like the Sport Association of Schleswig-Holstein. The local saving banks provide an annual co-funding (Investitionsbank Schleswig Holstein 2015a, b, c).
- **Zaar (Donation & Reward, Malta)**: ZAAR is a donation- and reward-based crowdfunding platform which is funded by the Maltese Ministry for Economy, but also from the Arts Council Malta to help promote the artists and creatives in Malta (Zaar 2013).

5.6 Conclusion

This chapter has introduced the field of civic and local crowdfunding by clarifying concepts and taxonomies. It also discussed and compared two frameworks of collaboration and has extended both models.

The challenge for public authorities is to find an adequate starting point for entering the collaboration with a crowdfunding platform. Academic research (Davies 2014; Wenzlaff 2017; Oliva 2018; Brent and Lorah 2019; Desmoulins and Charbit 2017; Van Montfort et al. 2020) and practitioners' guides (CrowdfundPort 2017; European Commission, European Investment Bank, and fiCompass 2019; Wenzlaff 2020c) have posited that the options for public authorities are equally well-suited. However, this approach, as captured in the Davies 2.0, does not serve to understand the learning curve which public authorities have to follow.

The chapter discussed another framework labelled to be the Griffith-model: The novelty of the framework developed by Hannah Griffiths (Future Cities Catapult and Griffiths 2017) stems from a tiered approach to expand the collaboration, essentially proposing to capture the low-hanging fruits of technical capacity building and training, before moving into more sophisticated models of interaction, which would involve sharing of financial risks. Since the more sophisticated models of interactions are more challenging also in terms of financial market regulation, public

authorities can use the tiered approach to slowly learn about the legal constraints imposed by business models that offer a financial return crowdfunding.

The tiered approach connects nicely with an emerging strand of crowdfunding literature which explains the development of crowdfunding ecosystems through maturity levels (Kleverlaan 2016; Kleverlaan and Wright 2017; Wenzlaff 2019; Odorović et al. 2020). These maturity levels display a joint movement of regulatory regime, dominance of business models, crowdfunding volumes and self-regulation activities. While it would be beyond the scope of this chapter to explain this in detail, it is worthwhile to keep in mind that this form of literature sees the above characteristics of the crowdfunding ecosystem as fundamentally connected. The existence of public-private collaboration in crowdfunding is, in that system-based analysis, one of the corner stones of increasing maturity of crowdfunding.

The chapter contributes to academic literature by providing a list of public-private collaborations. The list of examples shows that the tiered model (Griffith 2.0) can allow public authorities to identify a starting point for the collaboration with a crowdfunding platform in their territory.

There are limitations to the research in this chapter. First of all, the next step is to expand the discussion of the examples by taking into account data on funding volume. Secondly, it would be prudent to develop success factors for the collaboration and expand upon the benefits and challenges listed. Thirdly, it would be necessary to elaborate on the legal challenges which public authorities face when interacting with the crowdfunding platform. Some of these next steps will be done in a publication currently prepared by the author of this chapter, together with Ronald Kleverlaan and Ana Odorović as part of a project for DG Regio and the European Commission (European Commission and DG Regio 2020; European Commission et al. 2021). However, the chapter serves to provide the reader with an overview of the current status of research in the theoretical and practical analysis of the collaboration of public authorities and crowdfunding platforms.

References

ACCIÓ - Agència per la Competitivitat de l'Empresa (2013) Recomanador de finançament alternatiu. ACCIÓ - Agència per la Competitivitat de l'Empresa. http://www.accio.gencat.cat/ca/serveis/financament/recomanador-financament-alternatiu/

Ackermann E, Bürger R, Rockel J, Becker A, Duttmann S (2019) Kommunales Crowdfunding im Freistaat Sachsen - Neue Wege in der Finanzierung kommunaler Projekte. Kurzstudie im Auftrag der Sächsischen Aufbaubank - Förderbank. Fraunhofer-Zentrum Für Internationales Management und Wissensöknomie IMW

Aescuvest (2019) Der Startschuss ist erfolgt – erste Kampagne auf Aescuvest.eu gestartet. aescuvest.de (blog). 27 August 2019. https://www.aescuvest.de/blog/der-startschuss-ist-erfolgt-erste-kampagne-auf-aescuvest-eu-gestartet/

Aescuvest (2020) Das Aescuvest Modell. https://www.aescuvest.de/so-funktionierts/das-aescuvest-modell/

Assenmacher K (2017) Crowdfunding als kommunale Finanzierungsalternative (essentials). Springer Gabler, Wiesbaden

Bone J, Baeck P (2016) Crowdfunding good causes. https://www.nesta.org.uk/sites/default/files/crowdfunding_good_causes-2016.pdf
Bonini T, Pais I (2017) Hacking public service media funding: a scenario for rethinking the license fee as a form of civic crowdfunding. Int J Media Manag 19(2):123–143. https://doi.org/10.1080/14241277.2017.1298109
Boyle TM (2016) the city and the crowd: an exploration of civic crowdfunding disruption to local government led city planning and the quest to co-create liveability. https://doi.org/10.13140/RG.2.2.13661.61921
Brandkamp M, Zillikens S (2017) Die Venture-Finanzierung im Life-Science-Bereich. In: Becker J, Villinger TR (eds) Life science venturing. Springer Fachmedien Wiesbaden, Wiesbaden, pp 189–204. https://doi.org/10.1007/978-3-658-06382-5_9
Brent DA, Lorah K (2019) The economic geography of civic crowdfunding. Cities 90 (July):122–130. https://doi.org/10.1016/j.cities.2019.01.036
Citizenergy (2015) Your power - take part in the energy revolution. https://citizenergy.eu/
Conda, and Österreichische Hotel und Tourismus Bank (2016) We4Tourism. https://www.we4tourism.at/
Creative City Berlin (2018) Crowdfunding Berlin. https://www.crowdfunding-berlin.com/de/
Crowdculture (2013) Finansiera Dina Projekt Och Hitta Din Publik Med CrowdCulture. https://crowdculture.se/
CrowdfundPort (2017) Civic crowdfunding - matching with European Union Funds. Crowd-Fund-Port (blog). https://www.crowdfundport.eu/for-policy-makers/civic-crowdfunding-matching-with-european-union-funds/
CrowdfundPort, Interreg Central Europe (2016) List of barriers for internationalization of crowdfunding platforms. https://www.interreg-central.eu/Content.Node/CROWD-FUND-PORT/CFP-D.T1.1.3-Barriers-to-internationalization.pdf
Davies R (2014) Civic crowdfunding: participatory communities, entrepreneurs and the political economy of place. Master Thesis, Massachusetts Institute of Technology. https://dspace.mit.edu/bitstream/handle/1721.1/89954/890127961-MIT.pdf?sequence=2
Davies R (2015a) Understanding the crowd, following the community: the need for better data in community development crowdfunding. Federal Reserve Bank of San Francisco. http://www.frbsf.org/community-development/publications/working-papers/2015/december/understanding-the-crowd-following-the-community-better-data-in-crowdfunding/
Davies R (2015b) Three provocations for civic crowdfunding. Inf Commun Soc 18(3):342–355. https://doi.org/10.1080/1369118X.2014.989878
Dejean S (2019) The role of distance and social networks in the geography of crowdfunding: evidence from France. Reg Stud 2019:1–11. https://doi.org/10.1080/00343404.2019.1619924
Desmoulins G, Charbit C (2017) Civic crowdfunding: a collective option for local public. OECD regional development working papers 2017/02. https://doi.org/10.1787/b3f7a1c5-en
Donati S (2014) Portico of san Luca restored with crowdfunding project. ITALY magazine. 8 June 2014. https://www.italymagazine.com/news/portico-san-luca-restored-crowdfunding-project
Edlund A (2013) Crowdfunding Som Finansieringsmöjlighet Inom Kultursektorn: En Fallstudie Av Plattformen Crowdculture
EIF (2019) Lending Marketplace October Announces New €100 Million Commitment from European Investment Fund and Other Leading Investors to Support European SMEs'. 27 November 2019. https://www.eif.org/what_we_do/guarantees/news/2019/efsi-eif-october.htm
Eppela (2018) 'Eppela. Il Comune Di Milano Investe Sull'innovazione Sociale. Eppela. https://www.eppela.com/en/mentors/comunemilano
European Commission (2014a) Glossary - "Managing Authority"'. https://ec.europa.eu/regional_policy/en/policy/what/glossary/m/managing-authority
European Commission (2014b) Managing authorities. https://ec.europa.eu/regional_policy/en/atlas/managing-authorities/

European Commission (2018a) Impact Assessment. Commission Staff Working Document. https://ec.europa.eu/info/sites/info/files/180308-proposal-crowdfunding-impact-assessment_en.pdf

European Commission (2018b) Proposal for a Regulation of the European Parliament and of the Council on European Crowdfunding Service Providers (ECSP) for Business. COM/2018/0113. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52018PC0113

European Commission (2018c) Regional Development and Cohesion Policy 2021-2027. 6 August 2018. https://ec.europa.eu/regional_policy/en/newsroom/news/2018/06/06-08-2018-regional-development-and-cohesion-policy-2021-2027.

European Commission (2020) €6 million guarantee to Finora Capital. Text. European Commission - European Commission. 14 October 2020. https://ec.europa.eu/commission/presscorner/detail/en/ip_20_1900

European Commission, and DG Regio (2020) Unlocking the Crowdfunding Potential for the European Structural and Investment Funds (ESIF). https://etendering.ted.europa.eu/cft/cft-display.html?cftId=5907

European Commission, and DG Regio (2021) European structural and investment funds. Text European Commission - European Commission https://ec.europa.eu/info/funding-tenders/funding-opportunities/funding-programmes/overview-funding-programmes/european-structural-and-investment-funds_en

European Commission, DG Regio, Wenzlaff K, Kleverlaan R, Odorović A, Kessler B, Araujo LN, Karaki K (2021) Unlocking the crowdfunding potential for the European structural and investment funds (ESIF). European Commission, DG REGIO

European Commission, European Investment Bank, and fiCompass (2019) New financial instruments for ESF - crowdfunding. Fi-Compass 18 December 2019. https://www.fi-compass.eu/news/2019/12/new-financial-instruments-esf-crowdfunding

European Crowdfunding Network (2019) European Structural & Investment Funds. European Crowdfunding Network (blog). https://eurocrowd.org/work-groups/european-structural-investment-funds/

European Crowdfunding Network, and Francesca Passeri (2018) Triggering participation - a collection of civic crowdfunding and match-funding experiences in the EU

European Union (2013) Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013 Laying down Common Provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund, the European Agricultural Fund for Rural Development and the European Maritime and Fisheries Fund and Laying down General Provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund and the European Maritime and Fisheries Fund and Repealing Council Regulation (EC) No 1083/2006. OJ L. vol 347. http://data.europa.eu/eli/reg/2013/1303/oj/eng

European Union (2020) Regulation (EU) 2020/1503 of the European Parliament and of the Council of 7 October 2020 on European Crowdfunding Service Providers for Business, and Amending Regulation (EU) 2017/1129 and Directive (EU) 2019/1937 (Text with EEA Relevance). OJ L. 347. http://data.europa.eu/eli/reg/2020/1503/oj/eng.

Finora Capital (2020) For investors. Finora Capital (blog) 2020. https://finoracapital.eu/en/for-investors/

Foà C (2019) Crowdfunding cultural projects and networking the value creation: experience economy between global platforms and local communities. Arts and the Market 9 (2):235–254. https://doi.org/10.1108/AAM-05-2019-0017

Future Cities Catapult, and Hannah Griffiths (2017) Civic crowdfunding a guidebook for local authorities. Future Cities Catapult, UK. https://futurecities.catapult.org.uk/project/civic-accelerator/

Gajda O, Marom D, Kleverlaan R, De Buysere K (2012) A framework for European crowdfunding. https://eurocrowd.org/2012/10/29/european_crowdfunding_framework/

Ginger (2021) Riparte Crowdfunding Civico del Comune di Milano!' 28 January 2021. http://www.gingercrowdfunding.it/blog/riparte-crowdfunding-civico-del-comune-di-milano.html

Graz-Präsidialabteilung, Stadtportal der Landeshauptstadt Graz (2016a) Crowdfunding-Förderung - Wirtschaft Graz. http://www.wirtschaft.graz.at/cms/beitrag/10266560/6963342/

Graz-Präsidialabteilung, Stadtportal der Landeshauptstadt Graz (2016b) Richtlinie Crowdfunding Förderung - Stadtportal der Landeshauptstadt Graz. www.graz.at. https://www.graz.at/cms/beitrag/10320637/9231938/Richtlinie_Crowdfunding_Foerderung.html

Günther E, Riethmüller T (2020) Akteure und Formen des Crowdfunding. In: Günther E, Riethmüller T (eds) Einführung in das Crowdfunding: Formen, Anwendungsbereiche, Erfolgsfaktoren, rechtlicher Rahmen. Springer Fachmedien, Wiesbaden, pp 7–17. https://doi.org/10.1007/978-3-658-14590-3_2

Hainzer M, Stötzer S, Ellmer M (2014) Crowdfunding-Basierte Bürgerkreditmodelle in Kommunen. Zeitschrift Für Öffentliche Und Gemeinwirtschaftliche Unternehmen:1–2

ICFC (2020) Predstavljen Inovativni Program Financiranja Projekata Temeljen Na Crowdfundingu i Proračunskim Sredstvima Splitsko-Dalmatinske Županije'. International Crowdfunding Center. 23 June 2020. https://crowdfundingvision.com/predstavljen-inovativni-program-financiranja-projekata-temeljen-na-crowdfundingu-i-proracunskim-sredstvima-splitsko-dalmatinske-zupanije/

INVEGA (2020) Businesses most affected by COVID-19 may apply for liquidity loans as first agreement with financial institution signed. INVEGA (blog). 23 April 2020. https://invega.lt/en/businesses-affected-covid-19-offered-liquidity-loans/.

Investitionsbank Schleswig Holstein (2015a) WIR BEWEGEN.SH. https://www.wir-bewegen.sh/seite/ibsh

Investitionsbank Schleswig Holstein (2015b) WIR BEWEGEN.SH-Partner. https://www.wir-bewegen.sh/seite/paten-und-partner

Investitionsbank Schleswig Holstein (2015c) WIR BEWEGEN.SH-PremiumPartner. https://www.wir-bewegen.sh/premium-partner

Kaišiadorys Tourism and Business Center (2020) Business support. Kaišiadorys, Kaišiadorių Turizmo Ir Verslo Informacijos Centras. http://turizmas.kaisiadorys.lt/en/business-support/

Kleverlaan R (2016) Expanding the Crowdfunding Market in SE Europe. http://www.bi.undp.org/content/dam/croatia/docs/Research%20and%20publications/environment/Expanding%20the%20Crowdfunding%20Market%20in%20SE%20Europe%20-%20Ronald%20Kleverlaan.pdf

Kleverlaan R, Wright T (2017) Current state of crowdfunding in Europe. CrowdfundHub, Amsterdam. https://www.sbs.ox.ac.uk/sites/default/files/Entrepreneurship_Centre/Docs/OxEPR2/current-state-crowdfunding-europe-2016.pdf

Kukla L (2014) Stadt- Und Regionalentwicklung 2.0 – Crowdfunding Als Kommunales Förderinstrument. Universität Eichstätt

LeihDeinerStadtGeld GmbH (2012) Investment Investition in Freiwillige Feuerwehr. https://www.leihdeinerstadtgeld.de/oestrich-winkel

London City Hall (2020) Get Involved-Make London. London City Hall 19 June 2020. https://www.london.gov.uk//what-we-do/regeneration/funding-opportunities/make-london/get-involved

Mayer M (2018) Examining community dynamics of civic crowdfunding participation. Computer Supported Cooperative Work (CSCW) 27(3–6):1137–1151. https://doi.org/10.1007/s10606-018-9307-3

muenchen.de. (2015) Crowdfunding-Plattform für München. muenchende 16 July 2015. https://www.muenchen.de/aktuell/2015-07/start-fuer-crowdfunding-plattform-place2help.html

Müllerleile T, Joenssen D, Müllerleile A (2014) Crisis, co-financing, and crowdfunding: igniting regional development, pp 277–285

October (2020) Werden Sie einer unserer Partner. October Deutschland (blog). https://de.october.eu/partnerschaft/

Odorović A, Wenzlaff K (2020) The joint production of confidence – self-regulation in European crowdfunding markets. Balt J Manag 15(2):303–331. https://doi.org/10.1108/BJM-04-2019-0119

Odorović A, McKain G, Garvey K, Schizas E, Zhang BZ, Rowan P, Ziegler T (2020) FinTech innovation in the Western Balkans: policy and regulatory implications and potential interventions. Available at SSRN 3619214

Old R, Boyle D, Baeck P, Bone J (2019) Taking ownership: community empowerment through crowdfunded investment. Nesta

Oliva N (2018) Crowdfunding and civic crowdfunding: theoretical features and future prospects. In: Ubaldo Comite. Public Management and Administration, August. https://doi.org/10.5772/intechopen.74739

Pacchi C, Pais I (2020) Civic crowdfunding in Milan: between grass-roots actors and policy opportunities. In: Gajda O, Marom D, Wright T (eds) CrowdAsset. World Scientific, New York, pp 257–273. https://doi.org/10.1142/9789811207822_0011

Passeri F (2017) The European dimension of civic crowdfunding. European Crowdfunding Network

Produzioni Dal Basso (2019) Produzioni Dal Basso - Idee e Storie Da Finanziare in Crowdfunding. https://www.produzionidalbasso.com/network/di/comune-di-milano#comunedimilano-initiative

Rowan P, Miller M, Zhang BZ, Appaya S, Ombija S, Tejani AM, Markova D, Papiasse D, Smit H, Ward T (2020) Global COVID-19 FinTech Regulatory Rapid Assessment Study - CCAF Publications. University of Cambridge Alternative Finance Center. https://www.jbs.cam.ac.uk/faculty-research/centres/alternative-finance/publications/2020-global-covid-19-fintech-regulatory-rapid-assessment-study/

Samuelson PA (1954) The pure theory of public expenditure. Rev Econ Stat 36(4):387. https://doi.org/10.2307/1925895

SIDA (2020) Sida's Guarantee Instrument. Sida. 23 December 2020. https://www.sida.se/en/for-partners/private-sector/sidas-guarantee-instrument

Spacehive (2017) Mayor of London - Spacehive Profile. https://www.spacehive.com/profile/greaterlondonauthority#funds

Spacehive (2019) Spacehive - Crowdfunding For Local Projects. https://www.spacehive.com/

Stam FC, Spigel B (2016) Entrepreneurial ecosystems. Working Papers 16–13. Utrecht School of Economics. https://ideas.repec.org/p/use/tkiwps/1613.html

Stam FC, van de Ven A (2018) Entrepreneurial ecosystems: a systems perspective. Working Papers 18–06. Utrecht School of Economics. https://ideas.repec.org/p/use/tkiwps/1806.html.

Stewart J (2012) Multiple-case study methods in governance-related research. Public Manag Rev 14(1):67–82. https://doi.org/10.1080/14719037.2011.589618

Trine (2018) Making it safer, easier and more impactful to invest sustainably, Medium 6 August 2018. https://medium.com/trine-blog/making-it-safer-easier-and-more-impactful-to-invest-sustainably-411335321e97

Van Montfort, Kees VS, De Graaf FJ (2020) Civic crowdfunding in local governments: variables for success in the Netherlands? J Risk Financ Manag 14(1):8. https://doi.org/10.3390/jrfm14010008

Voorjebuurt (2018) Voor Je Stadsie: Krijg Mensen Mee Voor Jouw Utrechtse Idee. https://voorjestadsie.nl/nl/

Weber M (2019) Politik als Beruf. Nikol Verlagsgesellschaft mbH & Co. KG

Wenzlaff K (2016) Civic crowdfunding – definition. Ikosom - Institut Für Kommunikation in Sozialen Medien (blog). 20 July 2016. http://www.ikosom.de/2016/07/20/civic-crowdfunding-definition/

Wenzlaff K (2017) Civic Crowdfunding – Finanzierung von Öffentlichen Gütern. In: Crowd entrepreneurship: Das Gründungsgeschehen Im Wandel

Wenzlaff K (2019) Developing a policy framework for emerging crowdfunding ecosystems. ORF Policy Briefs, no. 302, p 12

Wenzlaff K (2020a) Civic crowdfunding - overview of the literature and contribution to academic debate. SSRN Working Paper

Wenzlaff K (2020b) Civic crowdfunding: four perspectives on the definition of civic crowdfunding. In: Advances in crowdfunding: research and practice. Springer, New York, pp 441–472

Wenzlaff K (2020c) Civic crowdfunding in Germany—an overview of the developing landscape in Germany. In: Crowd assets

Wenzlaff K, El Mallouki J, Partale A (2015) Civic Crowdfunding – Wie Crowdfunding Die Stadt Verändert Und Welche Potenziale Das Neue Finanzierungsinstrument Für Städte Und Regionen Hat. AWV-Informationen, no. Heft 2; März/April 2015. http://www.awv-net.de/publikationen/awv-informationen/2015/info-2-2014-kopie.html

Wenzlaff K, Institut für Kommunikation in sozialen Medien ikosom (2017) Response to Impact Assessment - Legislative Proposal for an EU Framework on Crowd and Peer to Peer Finance. https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2017-5288649/feedback/F7887_en?p_id=124034

Wenzlaff K, Kleverlaan R, Odorović A (2020a) Where and how do public authorities and crowdfunding platforms collaborate? LinkedIn Article (blog). 5 December 2020. https://www.linkedin.com/pulse/where-how-do-public-authorities-crowdfunding-karsten-wenzlaff

Wenzlaff K, Odorović A, Ziegler T, Shneor R (2020b) Crowdfunding in Europe: between fragmentation and harmonization. In: Shneor R, Liang Z, Flåten B-T (eds) Advances in crowdfunding: research and practice. Springer, Cham, pp 373–390. https://doi.org/10.1007/978-3-030-46309-0_16

Zaar (2013) Partners. ZAAR (blog). http://www.zaar.com.mt/partners/

Ziegler T, Shneor R, Wenzlaff K, Odorović A, Johanson D, Hao R, Ryll L (2019) Shifting paradigms - the fourth European alternative finance benchmarking report. 4. Cambridge Centre for Alternative Finance. https://www.jbs.cam.ac.uk/faculty-research/centres/alternative-finance/publications/shifting-paradigms/

Ziegler T, Shneor R, Wenzlaff K, Wang BW, Kim J, Odorović A, Ferri de Camargo Paes F, et al (2020a) The global alternative finance market benchmarking report. University of Cambridge Alternative Finance Center. https://www.jbs.cam.ac.uk/faculty-research/centres/alternative-finance/publications/the-global-alternative-finance-market-benchmarking-report/

Ziegler T, Zhang BZ, Carvajal A, Barton ME, Smit H, Wenzlaff K, Natarajan H, et al (2020b) Global COVID-19 FinTech market rapid assessment study - CCAF publications. University of Cambridge Alternative Finance Center. https://www.jbs.cam.ac.uk/faculty-research/centres/alternative-finance/publications/2020-global-covid-19-fintech-market-rapid-assessment-study/

Zoellig R (2017) Die Relevanz von Civic Crowdfunding Als Kommunales Finanzierungs - Sowie Beteiligungsinstrument in Der Deutschen Stadtentwicklung. Westfälische Wilhelms-Universität Münster Institut für Geographie Masterarbeit im Fach Humangeographie – Raumkonflikte, Raumplanung, Raumentwicklung

Chapter 6
The Crowdfunding as an Innovative Tool for the Economic and Social Promotion of Local Authorities in Morocco: Barriers and Opportunities

Abdelali Ezziadi and Mohammed Fikri

Abstract Crowdfunding or crowd financing is a financial practice that began in 2008 in the United States and is increasingly popular around the world. According to a World Bank study crowdfunding could represent a potential of $93 billion per year by 2025 for developing countries. For the Middle East and North Africa region, this potential is estimated at $5.6 billion per year by 2025". Insofar as it relies on the Internet, crowdfunding is an innovative alternative to conventional sources of financing, which brings together three players—the project sponsor, the public and a collaborative financing company—and is based on three sources of funding: grants, loans and capital investment. In Morocco, the legal framework for crowdfunding has just been instructed by the promulgation of Law 15-18 in 2020 and its implementing decrees, thus laying the foundations for a collaborative finance industry with very significant potential. Moreover, a strong demand for crowdfunding in Morocco remains unsatisfied. Although professionals in the sector in Morocco are fairly confident about the evolution of crowdfunding, it must be said that the growth of this type of financing is linked to a number of factors that contribute to its development.

Keywords Crowdfunding · Social development · Opportunities · Barriers

A. Ezziadi (✉)
Polidisciplinary Faculty of Sidi Bennour, University of Chouaib Doukkali, El Jadida, Morocco
e-mail: ezziadi.a@ucd.ac.ma

M. Fikri
Faculty of Economic and Management, Hassan I University, Settat, Morocco

R. Lenart-Gansiniec, J. Chen (eds.), *Crowdfunding in the Public Sector*,
Contributions to Finance and Accounting,
https://doi.org/10.1007/978-3-030-77841-5_6

6.1 Introduction

Since the year 2000, Morocco has been in a process of advanced regionalization. A strategic choice that aims to better convergence and targeting of public policies and a reduction of territorial disparities. Thus, local authorities, with a thorough knowledge of their areas of action, have a central role to play in optimizing the limited and insufficient resources at their disposal to better meet citizens' expectations.

To meet the financing needs of local authorities' public projects, crowdfunding is an innovative alternative to conventional funding sources. Developed in the United States in 2008, this collaborative financing represents a potential of $5.6 billion per year by 2025 for the Middle East and North Africa region (World Bank 2013).

In Morocco, the legal framework for crowdfunding has just been instructed by the promulgation of the law 15-18 in 2020 and its implementing decrees, thus laying the foundations for an industry with a very important potential. Moreover, a strong demand for crowdfunding in Morocco remains unsatisfied (Hemdane 2016).

In this context, the central objective of this work is to analyze the contribution of crowdfunding to economic and social promotion at the local level, while highlighting the obstacles and opportunities associated with this mode of financing. To this end, the state of the art on the development of crowdfunding in the public sector around the world will be presented. Then, we try to highlight the state of the art on this practice in Morocco, and more particularly in the public sector. And finally, based on secondary data, we highlight the obstacles and opportunities associated with collaborative funding in Morocco.

6.2 Details on Crowdfunding

In the following lines, we first try to define the term crowdfunding and briefly relate the history of its emergence. Next, we shed light on its practices at the foreign level.

6.2.1 Definition and Emergence of Crowdfunding

In reviewing the literature, we did not actually find a single, universal definition of the concept of crowdfunding. Nonetheless, the definitions formulated in this regard share a number of commonalities.

Generally speaking, crowdfunding consists of raising funds by collecting small amounts of money from the general public through the internet and social media. To this end, three categories of stakeholders are linked through this method of financing: project leaders, electronic platforms and a multitude of funders. The role of the internet therefore appears crucial in crowdfunding. In fact, it acts as a multiplier of possibilities.

Anglicism crowdfunding took off in the United States during the financial crisis in 2008 (Raguet and Le Teno 2017, p. 20), where banks no longer easily financed companies, especially for projects that are very risky and do not have a logic of financial profitability.

To this end, the birth of crowdfunding was initially motivated by the need to finance artistic and innovative projects. As Lefèvre and Popescu (2015, p. 32) had clearly pointed out, with this type of financing, project leaders in the arts industries were no longer confronted with financing constraints. Subsequently, crowdfunding was strongly redirected towards startups. Some platforms are becoming specialized in financing them, such as "Seedrs", which specifically targets European startups. Thus, collaborative financing is becoming increasingly widespread (Asli and El Idrissi Slitine 2013, p. 246), particularly in developed countries, thanks to renowned platforms such as Kickstarter, Kisskiss BankBank and Indiegogo.

In general, we distinguish three models of crowdfunding: reward-based crowdfunding or donation-based crowdfunding. The latter is lending, which is itself divided into two types: interest-free and interest-bearing (lending), and thirdly, we have equity crowdfunding.

In this vein, we would like to take this opportunity to underline something very important, which is that crowdfunding and Islamic finance generally share certain general principles in common, such as profit sharing and risk pooling.

6.2.2 International Crowdfunding Practices

Starting in 2008, crowdfunding has flourished internationally, especially in developed countries where it has been remarkably popular (Rhabra and Guerguer, 2015, p. 1).

In Africa, according to the Agence Française de Développement (2017), the most dynamic countries in terms of creating platforms are South Africa and Kenya. The Anglo-Saxon countries remain the leaders in collaborative financing and are becoming more and more involved in the creation of platforms place far ahead of Asia, which has recorded strong growth since 2012. On the other hand, European countries have lagged behind the Anglo-Saxon countries. This is basically explained by overly penalizing prudential rules and legislation that has been slow to be put in place.

For example, in France, crowdfunding was not properly regulated until 2014. According to the crowdfunding barometer in this country (KPMG, 2019), this method of financing has confirmed its momentum, with a 20% increase in funds raised in 2018. From 2013 to 2018, fundraising was multiplied by more than eleven times, from EUR 36 million to EUR 402 million. Another notable trend is the number of projects funded in 2018, which increased by 38% to 33,381 projects funded.

6.3 State of Pay on the Practice of Crowdfunding in Morocco

After having briefly discussed collaborative financing practices at the international level, we will talk this time about collaborative financing practices at the Moroccan level, while addressing a few clarifications regarding the corresponding law.

6.3.1 Crowdfunding Practices in Morocco

In the Moroccan context, there have been a number of significant events related to collaborative financing. In March 2016, the first conference on crowdfunding took place in Rabat, supported by the U.S. Embassy and under the patronage of the Moroccan Ministry of Economy and Finance. In May 2017, the Moroccan Federation of Crowdfunding (MFC) was created in collaboration with the Ministry and other actors in the collaborative financing ecosystem. Subsequently, thanks to some activism, a draft law on this form of financing emerged. On March 21, 2018, the Ministry of Economy and Finance submitted it to the General Secretariat of the Government. Thus, despite these multiple attempts, crowdfunding in Morocco remains underdeveloped in comparison to other foreign countries. In fact, until this moment, it does not yet have a legal and regulatory framework adapted to its development.

Despite this legal vacuum and legal constraints in Morocco, some platforms have been able to emerge, we have: Afineety, Smala & Co, Cotizi, Atadamone and Wuluj (http://afineety.com/, http://www.smalaandco.com/, http://www.cotizi.com/, http://www.maroc.ma/fr/discours-du-roi, https://www.wuluj.com/). For example, Smala & Co is a company under French law operating on Moroccan territory.

It has just suspended its activities due to a French regulation which was implemented on 01.01.2017 and whose objective is to strengthen the fight against money laundering. The said platform was able to finance 12 projects and collect MAD 246,000. In addition, a platform is one hundred percent Moroccan, it is in fact Cotizi. It is specialized in collecting donations and launching petitions. It did not leave Morocco by adapting to its legal context.

In fact, there is no lack of enthusiasm for collaborative funding in Morocco. This observation can be motivated through a multitude of illustrations, of which we only quote the following experience: in 2014, MAD 302,688 was raised on Cotizi within the framework of the project “MAD 100 to help”. The Moroccan population was mobilized to help the victims of the floods that devastated the southern regions.

6.3.2 *Law Number 15-18*

It is a text that provides a framework for the activity of Collaborative Finance Companies (CFCs) in their various forms. It then provides for several provisions, including, for example (Loi 15-18 relative au financement collaboratif n.d.): the creation of the status of collaborative financing platform manager, represented by the SFC; the definition of specific rules for each of the three aforementioned forms of collaborative financing.

However, this project has been widely criticized by platforms operating in Morocco. A director of operations within one of the latter has already pointed out to the press that the text of the project is modelled more on French legislation. The latter requires more control, which will make the daily management of the company more cumbersome. In short, the actors of collaborative financing hope that after the passage through the legislative circuit, the final version of this project is well cared for and meets the specificities of the Moroccan context.

In this context, the following central question arises: Why is this law still dragging in the Moroccan legislative circuit? Thus, among the possible explanatory hypotheses of this delay, we underline the following: crowdfunding can be possibly regarded by traditional banks as a major competitor. However, these two modes of financing are obviously complementary and do not actually target the same market.

6.4 Contributions of Crowdfunding for Social Entrepreneurship

Before addressing the topic of crowdfunding's contributions to social entrepreneurship, it's considered crucial to provide a brief overview of the notion of social entrepreneurship and its specificities.

6.4.1 *Social Entrepreneurship: Elements of Definition*

Social entrepreneurship is actually still young, but its practice is older. According to Asli and El Idrissi Slitine (2013), this concept is defined as "... any private initiative, led by one or more people advocating for change, combining economic efficiency and positive societal impacts, innovating in many ways, distributing few benefits and reinvesting in the societal mission".

The best-known international example of social entrepreneurship remains that of Bangladeshi Muhammad Yunus, who created the first microcredit institution the Grameen Bank, an idea for which he was awarded the Nobel Peace Prize in 2006. The mission of the Grameen Bank has been the eradication of poverty. Yunus is now nicknamed "the banker of the poor".

To get around the meaning of "social entrepreneurship," we have used the characteristics of social enterprise. In their article, Asli and El Idrissi Slitine (2013) rightly distinguished eight specificities. The diagram below highlights them:

For example, the characteristic "participatory governance" refers to governance that adopts a participatory dynamic involving the various parties concerned by the activity.

6.4.2 Contributions of Crowdfunding for Social Entrepreneurship

Given the above, we note that the social component is pervasive in both areas: social entrepreneurship and crowdfunding. This means that there is indeed a shift from the social to the social, and this through the financing by the general public of innovative projects with a social impact. Therefore, these two areas have a common objective which can be summed up in the positive impact on society.

In this perspective, several researchers have demonstrated that there is an intimate relationship between the social and human aspect of the project and its financing by the public. Among these authors, we cite: Belleflamme et al. (2010); Agrawal et al. (2011); Bauer-Leeb and Lundqvist (2012); Lehner (2013); Calic and Mosakowski (2016); and others. This thesis proves that contributors are more sensitive to the ideology and legitimacy of projects.

After digging into the literature on this topic, we were able to distinguish a diversity of crowdfunding contributions to social entrepreneurship. The following list, which is of course not exhaustive, succinctly identifies the most important contributions:

- Timeliness and accessibility of funding;
- Transparency and communication on the social project;
- Commitment to social entrepreneurship;
- Encouragement of patronage;
- Channeling of collective savings;
- Follow-up by subscribers;
- Financial inclusion;
- Diversification of financing;
- Credibility of the project;
- Strengthening of the social fabric;
- Frenzy of a diverse community around a social project;
- Increasing the legitimacy of the social project;
- Increase in trust and security;
- Improvement of the performance and creativity of the project;
- Democratization through the crowd selection process;
- Improvement of the notoriety and the brand image of the project;
- Attraction of philanthropic contributors (especially the Moroccan Diaspora);

- Liberation of energies and initiatives of young people with social projects; and
- Unlocking the funding system for associations.

In short, the characteristics of speed and accessibility represent added value compared to traditional funding (Bessière and Stéphany 2017). Also, the platforms, especially the donation platforms, open up extremely interesting perspectives, for development policies in particular, in order to develop entrepreneurial projects with high societal added value, for example in the fields of crafts, education, energy or agri-food.

The small amounts contributed, the fun aspect and the concrete and personalized side of the support contribute to the current success of the donation campaigns with or without reward, with a large number of people mobilized. Again, the crowd selection process is seen as more democratic (Lehner 2014).

Collaborative funding contributes to the credibility of projects and also serves as a steppingstone to other kinds of funding (Majid and Neysen 2017). Indeed, successful crowdfunding gives credibility to the project with banking or credit organizations, which subsequently facilitates the process of diversifying funding. In addition, the general public aspect reinforces the community dimension that social entrepreneurs enjoy through their crowdfunding, which again gives them a certain legitimacy. The crowdfunding process, which is perceived as more democratic, creates a certain excitement around social projects. This can lead to an increasingly diverse community.

6.5 Barriers to the Development of Crowdfunding in Morocco

Although crowdfunding is a practice that is becoming more and more known by young and ambitious Moroccan entrepreneurs, several barriers are hindering its expansion in the kingdom. These barriers are both stakeholders' confidence and financial sustainability (Alami and Ouezzani (2015); Markria & Bouhmouch(2017)).

6.5.1 Barriers Related to Lack of Financial Sustainability

Although crowdfunding funds are becoming increasingly important in Morocco, the business model of the platforms currently in place is not financially attractive enough for an entrepreneur. Indeed, these are essentially "marketplace" platforms that link demand and supply by means of commissions that do not exceed 6% of the funds collected. This commission rate, which is quite high, is limited by the expenses necessary to obtain an effective user as well as transaction fees, which are relatively high in Morocco. On the other hand, these platforms can propose only a limited

number of projects to be financed for fear of having too much offer and thus the failure of fundraising campaigns.

6.5.2 Lack of Stakeholder Confidence

One of the main specific challenges facing crowdfunding services in Morocco and around the world is the lack of trust among stakeholders. Indeed, with the multiplication of scams on the Internet, donors are quite distrustful of project leaders as well as of the platforms that act as intermediaries between them and donors. Also, in the case of problems, it is quite difficult to resort to judicial institutions and to register an insurance policy that can help build trust and security between the parties.

6.6 Conclusion

At the end of this paper, we conclude that crowdfunding has characteristics that are eminently compatible with the financing needs of social entrepreneurs. It therefore represents a solution more adapted to the financing of social entrepreneurship.

It should be noted that the technical constraints are relatively mitigated in Morocco, thanks to the development of digital technologies with a wide dissemination and evolution of mobile telephony, electronic banking and the Internet network (4G, fiber optics, etc.). However, the regulatory gap now represents a real loss of income for social project holders. In this sense, the approval of law 15-18 on collaborative financing will certainly be, among other things, a lever for the development of social entrepreneurship.

The regulation of collaborative financing proves to be indispensable but insufficient. Awareness-raising and communication campaigns will have to be conducted with the general public regarding its functioning and its advantages. The same should also be done with regard to traditional banks to inform them and convince them that collaborative financing is aimed at a market other than their own.

Before closing, we open a parenthesis to shed light on a research perspective on this subject; it is that a deepening of the results obtained in the framework of this research work is more and more solicited. This can, of course, be undertaken with the help of other more advanced quantitative studies by concretely measuring the impact of crowdfunding models on the development of the social entrepreneurial fabric in Morocco.

References

Agrawal AK, Catalini C, Goldfarb A (2011) The geography of crowdfunding (No. w16820). National Bureau of Economic Research

Alami Y, Ouezzani MR (2015) Le crowdfunding au Maroc: Essai sur les facteurs d'émergence, de blocage et de développement, 7èmes journées scientifiques internationales du FEM «Economie verte, croissance et développement : Etat des lieux et perspectives», Les 19 et 20 mars 2015 à la FSJES Marrakech

Asli A, El Idrissi Slitine A (2013) L'entrepreneuriat social au Maroc, Perception et pistes de développement. Revue Marocaine de Recherche en Management et Marketing 8

Bauer-Leeb M, Lundqvist E (2012) Social entrepreneurs and business angels–a quest for factors facilitating business relationships. Danube University Krems, Krems an der Donau

Belleflamme P, Lambert T, Schwienbacher A (2010) Crowdfunding: an industrial organization perspective. In: Prepared for the workshop 'Digital Business Models: Understanding Strategies', held in Paris in June (pp. 25–26).

Bessière V, Stéphany É (2017) Le crowdfunding: fondements et pratiques. De Boeck Supérieur

Calic G, Mosakowski E (2016) Kicking off social entrepreneurship: how a sustainability orientation influences crowdfunding success. J Manag Stud 53(5):738–767

Hemdane T (2016) Le crowdfunding, une innovation pour financer le développement du Maroc, Techniques Financières et Développement, 2016/3-4 (n°124), pages 27 á 34

KPMG (2019) Baromètre du crowdfunding en France 2018

Lefèvre F, Popescu BF (2015) Le crowdfunding à la française. Presses des Mines, Paris

Lehner OM (2013) Crowdfunding social ventures: a model and research agenda. Ventur Cap 15 (4):289–311

Lehner OM (2014) The formation and interplay of social capital in crowdfunded social ventures. Entrep Reg Dev 26(5–6):478–499

Loi 15-18 relative au financement collaboratif

Majid Y, Neysen N (2017) Le crowdfunding: quel impact sur l'entrepreneuriat social? Louvain School of Management

Markria D, Bouhmouch M (2017) Étude de faisabilité sur le Crowdfunding au Maroc en vue de l'implication de la Diaspora dans le développement du Maroc. Organisation internationale pour les migrations

Raguet A, Le Teno H (2017) Le financement participatif et l'aide publique au développement: état des lieux et enjeux. Agence Française de Développement. Notes techniques n°33. Septembre 2017

Rhabra S, Guerguer W (2015) Le Crowdfunding au Maroc: Modèles existants et perspectives de développement. Revue économie, Gestion et Société 2

World Bank (2013) Crowdfunding's potential for the developing world. Washington, DC. © World Bank, License: CC BY 3.0 IGO. https://openknowledge.worldbank.org/handle/10986/17626

Chapter 7
Real Estate Crowdfunding for Public Housing on the Blockchain

Hazik Mohamed

Abstract The rise of frontier digital technologies for financial services, like peer-to-peer (P2P) crowdfunding, indicates new ways to access alternative financing over traditional financing. This research contributes to the nascent literature on digital finance in real estate crowdfunding, and its potential of being applied to public housing. The idea of such a platform on the blockchain is this paper's second conceptual innovation. The rationale is to illustrate the significance of crowdfunding to alternative financing, and how blockchain technology might improve the weaknesses of crowdfunding. The real estate industry needs to embrace new solutions, capable of dealing with its traditional problems and to increase efficiency, sustainability, accountability and prevent market failures within the economy. In this new market environment, we review real estate crowdfunding acceptance in the US, Europe and Asia as well as conceptualize tech-enhanced platform that adopts the blockchain to improve the crowdfunding process for real estate public housing. This can be achieved by exploring new peer-to-peer (P2P) opportunities with better management of information and reduction in origination costs.

Keywords Digitalization · Distributed ownership · Peer-to-peer · Risk-sharing · Tokenization

7.1 Introduction

Although commercial and residential real estate investments are considered stable and safe when compared to other equities, they remain relatively inaccessible because of large capital requirements and the market intelligence that would make the investment profitable. Raising funds for real estate investments is inefficient, restricted to the privileged, connected and wealthy. Traditionally, real estate has

H. Mohamed (✉)
Stellar Consulting Group, Singapore, Singapore
e-mail: hazik@stellarcg.com

R. Lenart-Gansiniec, J. Chen (eds.), *Crowdfunding in the Public Sector*,
Contributions to Finance and Accounting,
https://doi.org/10.1007/978-3-030-77841-5_7

been one of the oldest modes of investing. Until recently, the sector has gone through a transformation, where the average investor can access deals via crowdfunding (Vogel and Moll 2014). Equity crowdfunding has arisen to be a new source of alternative financing to fund equity investments for both small and individual investors. This trend provides businesses with new opportunities to "pursue a wider group of external equity investors" (Walthoff-Borm et al. 2018) as well as small and individual investors. Equity crowdfunding, which includes real estate or property, is a method of financing, whereby the fund-raiser issues equity (or stakes) of a company to a 'crowd' of investors through a public campaign for investment via online platforms, and this seems to be developing quickly around the world.

The emergence of innovative digital financial technologies, like peer-to-peer (P2P) crowdfunding, indicates new ways to access alternative financing over traditional financing. This research contributes to the nascent literature on digital finance in real estate crowdfunding, and its potential of being applied to public housing. The idea of such a platform on the blockchain is this paper's second conceptual innovation. The rationale is to expound the application of crowdfunding to alternative financing, and how blockchain technology might improve the weaknesses of crowdfunding. In this qualitative research, we review the subject matter to analyze the development of crowdfunding in the U.S., Europe and Asia. The real estate industry is progressing towards innovative solutions to deal with its traditional problems and to enhance efficiency, sustainability, accountability and market failures within the economy.

Crowdfunding as a model essentially can overcome many traditional challenges of the investment industry. Venture capitalists (VCs) are strongly ROI-driven which makes them typically inclined to focus on potential 'future Amazons, Googles or Facebooks' for their investments. Crowdfunding, however, taps into the universe of micro-investors who can only pledge their surplus savings into projects which appeal to them. Because the amounts per investment pledge are small, it spreads the investment opportunities to the lower levels of society by giving them access to such asset-backed investment products. Also, crowdfund investors are more likely to take a risk on projects that appeal to them at a personal level, while VCs tend to focus only on the "strongest startups who can return three to 10 times on investments", or those deemed as the next best "exit". The risk on the investment are also spread well when there are multiple investors as opposed to a single VC that has to take on all the risk. Tapping into a larger pool of potential investors gives a higher chance for fund-raisers to secure capital for their important ideas that will benefit their target audience or beneficiaries.

7.1.1 Motivation

Real estate investments have peaked many investor interests since they are asset-backed and traditionally viewed as stable and safe. Real estate investments can also be a fixed income instrument as, for example, a rented apartment or unit provide a

steady monthly income through rental payments by tenants. The stability of cash flows monthly or bi-monthly assures a high preference for real estate assets, as a physical asset is viewed as less risky than intangible equities like publicly traded securities It was during the aftermath of the 2008 global financial crisis that investments in real estate (due to crafty subprime mortgages or such products) became unattractive, leading to low investment volumes. The introduction of mortgage-backed securities (MBS) introduced further complexity while trying to expand fund sources and improve liquidity. The false assumption that MBS would be a low-risk instrument was based on the ill-advised notion that mortgages debts are paid dutifully, so banks decided to allow sub-prime (or sub-standard) loans under detrimental conditions. The "number of sub-prime loans in the U.S. reached almost a quarter of total mortgages originated in 2006[1]". This resulted in a build-up of risk that became a massive sub-prime mortgage crisis, which turned out to be the main component of the 2008 global financial crisis that spread across national boundaries.

Needless to say, financing real estate needed a safer set of alternative financing tools. An alternative crowdfunded solution would significantly "increase the housing financing possibilities for many individuals and families".[2] Not having a financial intermediary in between will improve trust, where financing is direct between two willing parties.

In this research, we look at two recent innovation: crowdfunding and the blockchain technology. Crowdfunding became an efficacious and purposeful trend to the economy as a peer-to-peer platform to access funding from willing albeit small investors. It is fascinating that the "crowd can bundle its strengths and act as investor for small to large scale projects" (Marchand 2016). The low barrier to participate in such investments and ease of access to crowdfunding initiatives are what attracts and enables the large part of these entrepreneurs and investors to come together in such projects. Without the bank as a financial intermediary, the opportunities become open to people who are previously unable to access traditional financing due to non-existent or poor credit histories.

7.1.2 Research Objectives

The research objective was mainly to offer insights into the viability and operations of a real estate crowdfunding venture, and in the market context of Asia, Europe and the United States. Delivering insights is identified as exposing the nature of the different types of crowdfunding, illustrating the crowdfunding real estate markets in the aforementioned geographies, hypothesizing the reasons for their differences in

[1]US Financial Crisis Inquiry Commission (2011) Final Report of the National Commission on the Causes of the Financial and Economic Crisis in the United States, p. 70, https://www.gpo.gov/fdsys/pkg/GPO-FCIC/pdf/GPO-FCIC.pdf

[2]http://bakulbanyu111.blogspot.com/2018/05/homeland.html

development and determining the favorable provisos to invigorate the market with sound workable platform.

The key research questions are:

- Explore the growth of real estate crowdfunding platforms in the US, Europe and Asia.
- What are the financial and operational flows of a real estate that is being crowdfunded?
- Explore the use of asset-backed digital tokens in securitizing real estate assets.
- Can the requirement for trustees or custodians in creating such ownership instruments be replaced by the blockchain?

7.1.3 Rationale

Historically, "real estate has been inaccessible asset class to the average person, as it was limited by one's connections and status. In fact, in the Securities Act of 1933, securities of private investments were prohibited from being marketed to the public" (Cohen 2016). Due to this regulation, the typical small and individual investor were unable to access these real estate investments as they were not privy to advantageous market information. In addition, real estate investments often require enormous capital which can limit who can invest. In the evolution of this particular asset class, its availability to the common public has come in two kinds of products: Commercial Mortgage-Backed Securities (CMBS) and investments in Real Estate Investment Trusts (REITs).

The "Commercial Mortgage-Backed Securities (CMBS) are a form of fixed income investment backed by many commercial loans. They can be attractive because they often offer high credit quality and cash flow stability. CMBS is usually structured as multiple tranches, as aggregated real estate loans with varying size, location, and class are combined and securitized as bonds" (Manzi et al. 2008). They are then issued according to various classes of bonds that are rated according to their yield, payment priority, and tenure (Meister 2011). However, the size of the CMBS investments limits them to institutional investors.

The rationale is to illustrate the significance of crowdfunding to alternative financing, and how blockchain technology might improve the weaknesses of crowdfunding. The real estate industry needs to embrace new solutions to deal with its traditional problems and to increase efficiency, sustainability, accountability and market failures within the economy.

In this new market environment, we review real estate crowdfunding reception in the Asia, Europe and US, as well as conceptualize an advanced platform that utilizes the blockchain to improve the crowdfunding process for real estate public housing. The benefits of enhancing such peer-to-peer (P2P) platforms are in better management of information, efficiency and reduction in origination costs.

7.2 Literature Review

Although crowdfunding may only have been quite recently made popular as alternative sources of funding, it is not new and as has been around as early as the 1700s. In the 1700s, the Irish Loan Fund was established by the author and nationalist Jonathan Swift to provide loans to the poor in Dublin. The pool of funds was contributed by wealthier citizens as charitable help for the poor. In 1852, Hermann Schultz-Delitzsch created a collectively owned bakery and mill to deal with crop failure and famine that had hit Germany at the time. Six years later, Hermann and Friedrich Raiffeisen took the same idea and applied it to finance, inadvertently creating the first credit union. Similarly, in 1885, Joseph Pulitzer initiated an appeal through his newspaper *The New York World* to raise the US$2.5 million required to fabricate the base of the Statue of Liberty[3] which now become an iconic landmark for New York. The modern-day crowdfunding was recorded in 1997 when a rock band in the United Kingdom called Marillion, funded their much-requested reunion via online donations by fans, who wanted the reunion tour in the United States. Mark Kelly, the keyboardist, sent out an email to his 1000-strong mailing list, informing the fans that they would be out of $60,000 if they did the tour. The fans responded by crowdfunding what was required.

Then in 2005, P2P lending began to take off with the establishment of Kiva, a crowdfunding platform that was created to raise funds for underdeveloped regions of the world to fight global poverty. Since then Kiva has been extremely successful, and the platform has funded over US$834 million worth of micro-projects, with an average loan size of US$410 and an impressive repayment rate of over 98%.

7.2.1 Types of Real Estate Financing Available

While the large majority of SMEs remain underfunded by the big traditional banks based on their current credit scoring systems, the P2P lending (and crowdfunding) industry becomes a strong alternative, where the growth of the industry is an eclectic mix of unconventional lenders, user-friendly platforms, and novel products (Mohamed 2020).

Today, as more and more businesses and corporations seek non-traditional financing for their ventures and expansion plans, the industry has responded enthusiastically with new, or modifications to familiar products. Some of these forms are as follows:

(A) Non-bank Financial Institutions, such as credit unions, Community Development Financial Institutions (CDFI) and private equity or institutional investors through CMBS or REITs.

[3]The Statue of Liberty and America's Crowdfunding Pioneer." BBC.com. May 25, 2013.

(B) Asset-Based Financing

Sale and Leaseback Programs (or simply known as a "leaseback") allow the property owner or any asset of value, such as land or machinery, to "sell" it to a creditor and then "lease it back" for a fixed period. "Under this arrangement, the original property owner can quickly free up working capital while retaining possession and use of the property".[4] Some arrangements permit the borrower to purchase the property at the end of the financing period. However, the buyer receives tax benefits during the tenure period, which can come from benefits like claims on a depreciating of asset or property.

(C) Peer-Based or Crowdfunding Alternative Financing

Crowdfunding is a method of raising capital from individuals, and other investors at small quantum for a particular purpose (Mohamed 2020). By leveraging on the internet, crowdfunders can appeal to a wide crowd who are interested in investing a fraction of the investment required, if they are interested in the campaign or cause. There are several forms of crowdfunding platforms such as donation-based, equity-based and reward-based depending on its different structure and objectives. "Crowdfunding can be categorized into four: loan, equity, reward, and donation" (Mohamed 2020). "While the former two involves financial returns, the latter two have no payback". For the purposes of our discussion, we are only focused on the equity-based crowdfunding where capital is raised through crowdfunding and repaid with a certain amount of pre-agreed return on capital for a given tenure. Likewise, this can be used for public sector purposes. Governments can crowdfund capital for public sector projects (like public housing) and share the returns with the capital-providers.

A study by World Bank (2013) indicates that "there is an opportunity for up to 344 million people in developing economies to participate in crowdfunding". They find that "crowdfunding also opens access to funding and investment opportunities that are currently unavailable to customers at the 'bottom of the pyramid'". However, for people to gravitate towards digital financial services, the services have to be well-developed with robust payment systems, sound physical infrastructure, suitable regulations in place, and "vigorous consumer protection safeguards" (Demirgüç-Kunt et al. 2018) by the authorities and related stakeholders.

Regionally, the United States was the nation that began to implement modern "crowdfunding in 2007 and was subsequently followed by other markets after the 2008 global financial crisis" (Kim and Moor 2017) "driven by technology, as well as macroeconomic and regulatory factors" (Jenik et al. 2017).

[4] http://frugalentrepreneur.com/2012/10/confused-by-alternative-finance-10-types-of-alternative-lending-explained/comment-page-1/

7.2.2 Crowdfunding for Public Housing

In terms of impactful investment, affordable housing development is not new, but using crowdfunding to raise funds for housing is definitely innovative. The crowdfunding investors may, for instance, buy shares of the project with an annual return rate of 3–4%, depending on the project revenue. The publicly crowdfunded investment may be set to have 12-year terms, and investors can cash out every 3 years. Following the 12-year cycle, investors can choose to move their capital into a new fund for another project, which are essentially backed by the government.

Emphasizing the significance of public funding, it is "estimated that for every $1 invested by impact investors another $29 of funding has to be lined up from state and local investments, as well as other traditional housing financing sources".[5] Crowdfunding opens up new sources of funding for such noble affordable housing projects for the public which targets families earning below the median income levels. As such, many of the units are family-sized apartments typically with multiple bedrooms. These affordable public housing will also be located within walking distance to planned or existing light rail stations and other public transportation like bus services.

7.2.3 Blockchain-Enhanced Crowdfunding

Blockchain technology can relieve difficulties faced by traditional lending and crowdfunding. For example, crowdfunders could attract funding by selling tokenized assets. Smart contracts can also be used to guarantee that pledge contributions be returned when fund-raising failed to meet targets. Automated arrangements like this will allow project crowdfunders and their investors to firmly record their rights (Zhu and Zhou 2016) in a trackable and transparent manner.

The blockchain technology has attracted much attention because of its physiognomies: "secure and indelible, distributed ledger, decentralized data management, transparent and auditable, immutable, efficient, low cost, orchestrated and flexible" (Niforos et al. 2017). Its "decentralized and distributed ledger technology ensures data security, transparency, and integrity, which cannot be tampered with or forged", and thus it is considered an enormous opportunity for the lending and crowdfunding sectors within the finance industry.

The following demonstrates the benefits to building a crowdfunding platform on blockchain technology:

[5]Estimated by the Building Opportunity Fund by Bellwether Housing in https://www.theurbanist.org/2019/06/20/for-the-first-time-ever-crowdfunding-will-help-build-affordable-housing-in-seattle/

(a) use a blockchain-enhanced voting system which will allow the "shareholders to participate in corporate governance in a cost-effective and yet effective manner" (Zhu and Zhou 2016);
(b) use blockchain-enhanced smart contracts to track all agreements made between the investors and crowdfunders. Because all agreements are tracked, regulators can be allowed access to detect deceitful transactions (Zhu and Zhou 2016; Niforos et al. 2017) in cases of anti-money laundering or counter-terrorism financing investigations;
(c) develop an identity management system that acts like a fraud detection mechanism when onboarding users (Niforos et al. 2017), foiling theft and potential fraud; and
(d) authenticate investors and track transactions to regulate the quantum of investments and verify campaigns.

Other examples of crowdfunding utilizing blockchain is the Initial Coin Offerings (ICOs) and its more advanced cousin Securitized Token Offerings (STOs), where blockchain start-ups issue cryptocurrency or tokens to raise capital for their ideas.

7.2.4 Real Estate Crowdfunding Platforms in the U.S.

Crowdfunding, in general, has the ability to increase funding availability to borrowers seeking non-traditional financing through reaching out to micro-investors who are interested in their campaigns or cause.

Players in the real estate industry are joining the crowdfunding trend, attracted to the relatively low-risk access to the U.S. real estate market for the accredited American investors. Each of these platforms has its own forte and unique business strategy, with varying levels of minimum investment. For now, such platforms are limited to accredited investors who meet specific requirements for annual income, net worth and understanding of risks involved.

The stimulus for launching crowdfunding platforms, including those for real estate investments, was the route of the JOBS Act in 2012. Prior to the Act, any advertisement and solicitation for investors to consider real estate investments were prohibited by law. The JOBS Act (Title II) radically transformed the way investment capital can be raised by amending existing Regulation D rules, especially those rules relating to how businesses can offer and sell their financial securities products without having to register them with the Securities and Exchange Commission (SEC) of the U.S.

Previously, Regulation D Rule 506 put "restrictions on fundraising efforts, specifically limiting fundraising to only pre-existing clients and preventing businesses and their associates from openly campaigning those investment opportunities". The new Rule 506(c) "allows issuers, sponsors, syndicators, and others who are raising capital from private investors to market those private-investment opportunities to accredited investors under specified provisions" and came into effect on

September 23rd of 2013. The "new federal legislation represents a huge change for sponsors raising funds for a real estate acquisition or development. Essentially, Title II gives crowdfunding firms the green light to direct-market to a large pool of potential investors via social media and the Internet".[6] In effect, it has also crafted a new avenue for investors to acquire direct real estate investment opportunities.

Finally, in October 2015, the "SEC proposed rules for Title III of the JOBS Act allowing non-accredited investors to entry into the RECF arena". Multitudes of new investors seeking smaller investments are able to participate in real estate projects, which have now become available to them. "Non-accredited investors who earn US $100,000 or more are able to allocate 10% of their income into crowd-funded investments each year. The limit is set at 5% of their annual income or US$2000 for non-accredited investors who earn less than US$100,000 annually[7]". As a consequence, the progress of real estate crowdfunding in the United States skyrocketed, with it being a tool to invigorate the real estate sector. "Over seventy crowdfunding platforms support this new and dynamic market of real estate funding" (Marchand 2016) for development and investing.

7.2.5 Real Estate Crowdfunding Platforms in Europe

For young entrepreneurial firms, equity crowdfunding is a trendy resource for alternative finance. For example, "an estimated 20% of all early-stage equity investments occurred through equity crowdfunding platforms in 2015" (Beauhurst 2015) in the UK.

Despite this, Europe is lagging behind in the utilization of crowdfunding as financial resource when compared to the United States. Except for the UK, European countries do not have a vibrant real estate crowdfunding market with virtually non-existent facilitating platforms. In Italy, for instance, "crowdfunding for real estate projects is not yet permitted by Consob, the public authority responsible for regulating the Italian financial markets, although there are various platforms that are already using the concept in different ways" (Morri and Ravetta 2016).

Due to the open local Italian laws, there is openness and room for this new way of investment. Real estate crowdfunding is not feasible yet, but there are ways to attract investors through equity crowdfunding style platforms such as Italy-crowd, that uses Innovative Start-ups and CrowdRe that uses Innovative SMEs. The fact that in order to invest more than €500 an investor has to pass the MiFID[8] test slows down the

[6] https://www.investopedia.com/articles/investing/072514/real-estate-and-crowdfunding-new-path-investors.asp

[7] https://www.howardkennedy.com/en/latest/blog/regulation-of-crowdfunding-in-the-uk-us-and-israel_a-comparative-review

[8] The Markets in Financial Instruments Directive (MiFID) is a regulation that increases the transparency across the European Union's financial markets and standardizes the regulatory disclosures required for particular markets across the 31-member states of the European Economic Area (the

investment process. The maximum value of a deal of €5 million keeps the market away from the true real estate projects: in fact, Italy-crowd uses it only as a window for options of interest in order to be able to fund larger projects as the Miramare residence in Courmayeur on a club deal basis.

7.2.6 Real Estate Crowdfunding Platforms in Asia

The volume of online alternative finance across Southeast Asia[9] accounted for US $47 million in transactions in 2015. To put the volume in perspective, East Asia[10] grew rapidly, from US$123 million in 2014 to US$412 million in 2015, while Oceania—which includes Australia and New Zealand—accounts for both the biggest collective share and swiftest expansion in volume of online alternative finance transactions in the Asia-Pacific region, totaling more than US$621 million in 2015.

A World Bank study completed in 2019[11] included survey responses from online finance platforms operating in Indonesia, Malaysia, the Philippines, Singapore, and Thailand. Between 2013 and 2015, a total market volume of US$84 million was raised in the region. In 2013, US$10.9 million was raised, which grew to US$26.5 million in 2014—a year-on-year growth rate of 140 percent. In 2015, a total of US $46.6 million was raised, reflecting a slower growth rate of 76 percent. Another joint study[12] by the universities of Cambridge and Sydney, showed that "the average growth rate between 2013 and 2015 was 109 percent. With regards to total market volume by sector, equity-based real estate crowdfunding is the biggest market sector across Southeast Asia, with 39 percent of total market share between 2013 and 2016", predominantly driven by Singapore. The second largest model by total volume was invoice trading, with 20 percent of total volume between 2013 and 2017. According to the report, "Equity-based crowdfunding and marketplace/peer-to-peer business lending each accounted for just over 12 percent of total market volume in Southeast Asia over the last 5 years, with over US$11 million raised for both models. Donation-based crowdfunding made up 13 percent of the total market volume, with almost US$12 million raised". Reward-based crowdfunding accounted for the lowest percentage of alternative finance activity in the region, making up only 6 percent of total regional market volume and US$5.5 million raised between 2013 and 2017.

---

28 EU member states plus Iceland, Norway and Liechtenstein). The directive has been in force across the European Union (EU) since 2008.

[9]Southeast Asia includes Singapore, Malaysia, Thailand, Indonesia, Philippines, Brunei, Vietnam, Laos, Myanmar, and Cambodia.

[10]East Asia includes Japan, South Korea, Taiwan, and Hong Kong.

[11]http://documents1.worldbank.org/curated/en/328941558708267736/pdf/The-Digital-Economy-in-Southeast-Asia-Strengthening-the-Foundations-for-Future-Growth.pdf

[12]https://www.jbs.cam.ac.uk/wp-content/uploads/2020/08/harnessing-potential.pdf

According to Real Estate Crowdfunding Review website,[13] 2018 has been a significant year for the nascent industry as 13 sites fell off the top 25 rankings due to forsaking their business model or due to other difficulties. Five sites have advanced considerably with growing volume, and a few of these that were lower ranked have climbed up the charts as well. They report that platforms that have high operational transparency, seed-funding injection, high-volume of deal transactions, lower fees, solid management and customer service, and sound financial support are the best performers and will be sustainable. Those that have struggled or failed are those that have switched business models and had legal, financial, transaction volume, investor complaints or failed to administer and fulfill their obligations.

7.3 Methodology

The use of blockchain has been developed for P2P lending platforms issuing microloans serving small-scale consumer spending, but no such development has been done for the real estate market. The real estate industry is especially vulnerable from a trust as well as an operational perspective. Mortgage loans are substantially higher and being unable to fulfill obligations (defaulting on the loans) can create adverse outcomes for individuals and families, if it leads to a foreclosure on the property. As such, the qualification for a substantial loan requires a careful analysis of numerous factors in order to reduce the event of a default. The consequence is a complicated and drawn-out process, to adhere to a proven business framework.

The value chain for real estate entails of three distinguishing stages: origination, servicing, and securitization. Origination is the procedure loan application, approval and closing of the borrowing. Servicing means fulfilling the obligations of the loan agreement during its tenure (e.g. monthly repayments of loan principal amount and interest charges). Securitization involves the issuance of commercial instruments, which in this case, is the mortgage-backed securities (MBS). In the real estate origination process, a substantial quantity of documents, from various groups, needs to be gathered and scrutinized and this creates additional difficulties for information processing and assessment. The use of paper-based real estate files still persists even though some of these documents have already been digitized, so the industry practice is still rather cumbersome and drawn-out.

In contrast, the blockchain can generate records that are immutable and cloud-based which makes it easily accessible for processing the transactions. In addition, the conclusion of the loan itself can be digitally signed and the following issuance of the promissory note and real estate deed, can be done on the blockchain via tokens and smart contracts. A digital document, referred to as a smart contract, can be created with all the terms and conditions of an agreed upon contract.

[13] https://www.therealestatecrowdfundingreview.com/top-100-sites-ranked-and-reviewed

The smart contract is automated according to the set terms and conditions and cannot be interrupted by any entity within the distributed platform. As such, transactions and agreements can be carried out between disparate parties, completely peer-to-peer without intermediaries. In this way, transactions are trackable, transparent and immutable.[14] This would meaningfully improve the efficiency in the subsequent processes of servicing and securitization.

7.3.1 Real Estate Crowdfunding Mechanism

This proposed Real Estate Crowdfunding Platform (RECP) on the blockchain operationalizes real estate lending business logic with smart contracts. The core design is that borrowers and lenders are linked directly without any go-between (i.e. institutional intermediaries), through smart contracts that automatically execute agreed terms and conditions of the agreement.

To successfully originate any real estate financing, the agreement must follow a pre-set course—from the application for financing, to the actual sign-off on the deal and subsequent transfer of the property to the buyer. There is a critical sequence of transactional processes that take place, which depends on three loan requisites:

- loan size to cover the purchase the property;
- loan amount manageable by the borrower; and
- loan extended can be recovered in case of default or non-payment.

The entire process may be categorized as information flows, and financial flows. These flows, processes, and objectives are interconnected. Information flows are background information used to assess the creditworthiness of a borrower or the property market value. Financial flows are represented by the transfer of funds from the creditor to the seller. The first financial flow from the creditor to the seller fulfils the loan size required for the purchase (objective i). The information flow with regards to the borrower assesses the creditworthiness (objective ii) for the underwriting of the loan. The information flow with regards to the property is meant to cover the amount of the financing and assure a retrieval of the financing in case of default or non-payment (objective iii). The assessment regarding its value is based on market valuation of the asset.

In the blockchain version of the asset-backed investment, the "divisions" of assets (or trust certificates) issued to the investors can be distributed to them as (crypto) tokens which represents their portion/ownership of the underlying real estate. The process becomes much leaner and less cumbersome, with the:

- due diligence verification done via blockchain-enhanced KYC (know your client) and identity of issuers/entrepreneurs,

[14]Investopedia, "Smart Contracts", https://www.investopedia.com/terms/s/smart-contracts.asp

- rating of asset is based on assessment of issuer and asset done via automated market valuation methods,
- compliance and assessment done by an automated AI-driven review process,
- legal terms and allocation of dividends/payments done via smart contracts

The blockchain provides that element of confidence as it is the mechanism to enable trust and enforceability within its systems of processes and accountability. In an era that is geared towards decentralization, it is important to note that while decentralization allows us to circumvent a lot of formal time-consuming processes, including tedious regulations, we must not forget that without regulations, self-regulation becomes utmost important. If the finance industry does not want to be heavily policed, then we need to do right even when no one is watching. The blockchain ensures and operationalizes these aspirations through its immutable transparent transaction ledger system.

7.3.2 Credit History and Know-Your-Client (KYC)

The present creditworthiness assessments are usually carried out by independent credit bureaus. The computation of the creditworthiness scores and subsequent ratings depends on the models used by different agencies and bureaus, but the credit rating system of FICO (US-based) appears to be a standard that other regions also use. These factors that are included are typically credit or payment history, income/revenue and debt accumulated. Under this system, businesses (banks, entrepreneurs, corporations) and credit bureaus have to transfer information and personal data between one another, regularly sent back and forth, opening them up to security risks each time and leaving sensitive data potentially vulnerable to cyber-attacks and unscrupulous hacks. Also, credit histories are not transferrable across borders, and individuals have to re-establish their credit track records whenever they relocate. Furthermore, mortgagors in markets with less developed financial systems and regulatory infrastructure strain to access financing as creditors have limited KYC and scoring data to support credit decisions. Lastly, the current credit system underserves the ones who need it most. Credit systems depend on historical debt repayment information and hence cannot easily assist users who are new to credit. This is especially prevalent among minorities, the underbanked, and the youth who have little or no credit histories.

One of the key factors to lengthy origination processes for real estate is caused by the volume of borrower information needed to sufficiently assess his/her true financial status. Most of this information is filled manually, collated from different parties (banks, employer, etc.) in the form of physical documents. They contain the most relevant information on the financial state of the borrower – credit score, income levels against expenditures, outstanding debts, etc. Other types of information include personal data such as age, education level and profession. While creditworthiness assessments are mostly based on the first set of information, the

second set of personal data is progressively being used to predict credit repayment behavior. Other platforms, like P2P lending, are even scrutinizing user behaviors on apps they use as well as in social networking platforms, with the help of artificial intelligence (AI) and machine learning (ML) to get a snapshot of repayment behaviors. Hence, it is extremely important for the RECP to efficiently and accurately gather borrower information, as well as carry out a thorough creditworthiness assessment.

In the RECP's platform, the collection of information is performed digitally, obtaining the data residing in paper-based documents from a digital database built on the blockchain. This data is verified by the decentralized nodes of the blockchain, and when that is completed, AI-driven algorithms perform a creditworthiness evaluation of the borrower's application drawing data from sources mentioned. When specific conditions are satisfied, the real estate financing application is pre-approved. The real estate financing underwriting is not performed by humans but electronically according to pre-determined criteria without being subjected to human bias or errors. When the financing is pre-approved, all of its loan stipulations (amount, interest rate, tenure, etc.) are specified in a smart contract, and programmed as trigger events.

The appraisal of the property's value follows a market valuation process to determine the maximum size of the loan. The market valuation of a property is done by scrutinizing geographical economic data specific to transacted prices, proximity to existing and new amenities, environmental factors, property type and ownership form. This valuation is best done via experienced valuers, and it is best to take the average of three valuations from reputable real estate valuers. Looking forward, the process can be automated when valuation data from valuation assessments, rental and sale prices are fed into an AI-driven valuation system. In any case, RECP's platform can reduce the number of steps in originating a mortgage which improves efficiency.

7.3.3 Financial Flows

In RECP, the smart contract captures and, via integrated payment systems, automates the financial flows from the investors to the fundraisers and finally up to the point of sale. When a buyer is pre-approved in the public housing system, for their property of choice, the corresponding real estate financing is "listed" in RECP's platform. By that time, the mortgage amount is already determined, and the borrower to pledge a specified percentage for the down payment to initiate the smart contract for the crowdfunding financing.

On the opposite side of the platform, any individual prepared to become a lender can decide to engage in the campaign to invest his surplus funds. At this point of listing, each one of the real estate campaigns is financed through the P2P crowdfunding mechanism in the RECP as follows:

- Every pre-approved mortgage loan is "divided" into smaller, identical units. For example, a $350,000 mortgage can be divided into ten equal $35,000 "divisions."
- Every mortgage is rated with a risk score, which is pre-calculated and determines the terms of the pre-approved financing. The risk score determines the rate of return – higher risk, higher return and vice versa.
- Individuals can lend money to a specific borrower or different borrowers by "buying divisions" from single loans or different real estate loans with different risk scores.
- When all the "divisions" of a specific pre-approved financing are "bought" by investors, the crowdfunding campaign is closed.
- There is a campaign period during which the "divisions" will be up for "buying" by the crowd of investors. It will be set, e.g. 40 days to ensure timely closure of the loan. If after this time, the real estate financing is not fully invested (i.e. all "divisions" are not sold), the campaign is voided, and the funds collected thus far are refunded back to the respective investors.

Although the prices of the houses and the pre-approved loans are settled in local sovereign fiat currency, all financial flows are performed in the form of tokens (cryptocurrency). The deployment of crypto-tokens for funds movement is due to their quick and cost-effective operability: money transfer is done without transmission fees via crypto-wallets. Moreover, token flows better and efficiently with explicit terms and trigger conditions, while the traditional fiat currency payments are subjected to delays such as the T-2 settlement cycle via financial intermediaries. The token value of each of the financial sums (price, financing size, down payment) are pegged to the local fiat currency, essentially removing concerns on cryptocurrency volatility.

This RECP model infers that the sum of funds invested by the investors is equal to the financing received by the borrowers, i.e. a pre-approved real estate financing of $350k will equal the total amount of funds captured by the smart contract for that loan.

The benefit of the RECP crowdfunding method is its accessibility, ease and low barrier to investment. A shortcoming, however, comes from challenges in acquiring adequate investors for each investment listing or campaign. Until all "divisions" are "bought," the real estate financing cannot be successfully closed. If not, all divisions are bought before the campaign period expires, the campaign is cancelled.

7.4 Analysis and Discussion

There are several major challenges to blockchain applications in crowdfunding at the moment. These challenges include technical, business, government regulatory, and privacy challenges:

- The inexperienced or disadvantaged groups may not have the relevant expertise to attract funding for their campaigns. In equity-based crowdfunding platforms,

successful campaigners typically are able to raise interest in their campaigns to attract the required investments within the campaign period. To achieve this, the necessary skill sets in business, marketing and social networking need to be learned or attained.

- The crowd levels for equity-based crowdfunding is still comparatively minute around the world relative to other traditional investment channels. Given the low public awareness and limited investor pools at the moment, the potential is severely limited from being able to reach the desired levels of development. Likewise, "blockchain technology is still at its infancy stage, and thus it takes time to reach a critical mass of the ecosystem participants and to realize full network benefits" (Niforos et al. 2017).
- Regulatory guidelines also affect the ability of crowdfunding to scale. The present guidelines stipulate a cap (depending on jurisdiction) per project owner and per year for total crowdfunding investment. Beyond a pre-determined safety threshold, investors are required to declare their risk aversion if they decide to invest. These additional steps hinder interested parties from making equity crowdfunding as their preferred choice.
- It always takes time to adopt to technology, and this includes the blockchain and new platforms that use them like RECP. Like any paradigm shift, people should reconsider their business models and test its business and operational feasibility before making any strategic investments in the technology and developing use cases for it. Iansiti and Lakhani (2017) believe that to make smart contracts viable, "corporations and industry players including lawyers and regulators will need to develop an in-depth understanding of blockchain applications" and their specific use cases.
- The frontier nature of the technology holds back common set of standards that can enable the integrability of different systems in the market sectors. As blockchain evolves into the significant scalable driving force behind the fourth industrial revolution, setting standards will require coordinating the activity of many different actors.

Beyond the numerous potentials uses of blockchain technology, "one of the most important skills in the developing industries will be where it is and is not appropriate to use blockchain models" (Mohamed and Ali 2019). Blockchain helps tokenize systems for efficient peer-to-peer exchange and public records keeping, but not all business processes require them. Also, the size of operational factors is also important since every tiny micro-transaction does not need to be recorded on the blockchain.

There is a strong push towards finding the most effective ways to instill sound market principles to organize resources, inculcate prescribed behaviors, and have tracking and payments incentivization. There is also a movement, especially so after the airing of the 'Social Dilemma' on Netflix, that there should be a conscious effort to work out general ethical framework and protocols for how technology affects our behaviors through privacy concerns, e.g. AI-driven algorithms can prompt and influence large masses of individuals. The implications of utilizing control systems

and predictive analytics for social networks, adds fresh dimensions of challenges for tech-driven solutions, including blockchain applications which will be enhanced when paired with AI.

7.4.1 Realistic Approach to Blockchain Implementation

The excitement over blockchain technology the concept which underpins the Bitcoin platform for a dispersed and irreversible ledger that can be potentially applied to facilitate the exchange of *all* goods and services with improved trust from greater transparency and trackability. The utopian vision of the blockchain economy allows the technology to be the mechanism of trust that greases economic transactions throughout the world (Mohamed and Ali 2019). No transaction occurs without some degree of trust between transacting parties despite the legal contracts that bind them.

In the fully decentralized version of the public blockchain, the transactional histories are shared by all nodes in a public network. In terms of practical implementation for privacy, the RECP will not display all data of transactions in the network, as the access to transactions is not necessary, and should remain restricted to the contracting parties or in special case-by-case basis. This special access is limited to regulators or central authorities, if required for audit or pending some investigation. This form of private ledger protects the privacy of the transacting parties, and also provides flexibility to comply with different regulators. Eventually, when the global markets are ready, these private blockchain can be connected across ledgers to be a truly decentralized P2P version of the blockchain that was initially envisioned by the inventor of the Bitcoin. That full ecosystem should eventually be able to provide plug-and-play solutions for the entire value chain of the service delivery.

7.4.2 Overcoming Challenges to Blockchain Acceptance

Currently, varying degrees of support are given by regulators for the implementation of blockchain. Some central banks are directly promoting both cross-border payments and securities settlement using the blockchain. In contrast, "while some regulators have voiced concern for existing rules such as AML (anti-money laundering), most seem to be taking a more wait-and-see stance" (Mohamed and Ali 2019). Therefore, we recommend to critically "perform the appropriate assessment, including feasibility and skill evaluations, prior to any capability rollout to certify that the right use cases are considered and that the integration to legacy systems is thoughtfully planned and executed" (Ali et al. 2019). Institutions should be made to understand that business operating models along with its processes will be affected. As such, change management be necessary and an important consideration in order to remain competitive in the digital landscape.

New regulations will greatly influence the success of any decentralized infrastructure application since regulatory requirements have an impact on compliance expenses towards such an application. Conversely, "a well-planned, standardized, automatically consolidated ledger could offer immediate real-time access to the relevant regulator for all partner institutions on the network" (Mohamed and Ali 2019). This would remove considerable expenses and therefore compensate the compliance costs involved in developing the system. Any solution will have to match an organization's prevailing monetary ecosystem. Deliberating this before implementation or designing solutions will facilitate the integration better and improve the success rate.

7.5 Conclusion

While the safety factor of investing with people you know or meet physically, as in real estate investments, the Bernie Madoff scandal is the prime example of how "face to face" relationships do not necessarily protect investors (Vogel and Moll 2014). It may, in fact, be more difficult for scammers to defraud through lending platforms with the transparency of the blockchain and underwritten documentation automated by smart contracts. Perhaps, the combination of crowdfunding and blockchain technology may have the potential to drive out fraudsters of the market completely.

Instead, naïve investors may not fully understand the risks. Inexperienced investors can be led to believe that because the investment is asset-backed the risk is sufficiently mitigated. If the reality is that the real estate investments were highly leveraged and/or suffer from substantial challenges with their leases, then there is a high probability that investors could suffer investment losses. A lot of the investments that we researched had bloated internal rates of return. Such unrealistic returns seem to categorize them as high-risk investments.

Although, many early adopters unsurprisingly came out Silicon Valley of the United States, it is interesting to note that the biggest crowdfunding investment was made in Bogota, Colombia (Raskin 2013). Crowdfunding may be a strong alternative in countries like Colombia where capital markets are underdeveloped for various reasons, and where there is a lack of opportunities for investors who are looking for stable investment instruments like real estate. Similarly, for international investors, a blockchain crowdfunding may be an attractive way to invest in a safely crowdfunded real estate financing where the element of trust in underscored by a tamper-proof technology.

The evidence for P2P lending opportunities may be best described in the Lending Club story. "The Lending Club started in 2007 to offer peer to peer lending, enabling investors to make unsecured personal loans to prescreened borrowers. In the first year, the platform made US$4.8 million in loans. In the first three months of 2014 it raised and made US$781 million in loans and topped US$4 billion in loans since inception" (Vogel and Moll 2014).

7.5.1 Limitations of Research

As much as the research focused on the viability of a blockchain crowdfunding platform, the bigger picture of macroeconomic benefits was not scrutinized. It would be beneficial to also understand how the alternative finance volume per capita affects a country's GDP. It would be interesting to have empirical data which shows that the growth of alternative financing needs may in fact stimulate alternative investment activities that in turns improves the GDP of a nation.

7.5.2 Recommendations for Future Research

While this research highlights the benefits of utilizing blockchain for crowdfunding public housing, it also summarizes the key barriers to blockchain crowdfunding platforms. Future research could focus specifically on the advantages of blockchain crowdfunding platforms, and how it contrasts in different economies, jurisdictions and legal systems. Perhaps, we should first understand why such platforms are popular in Asia, the U.S. and the U.K. but not in the rest of Europe.

References

Ali H, Mohamed H, Hashmi HS, Hassan M (2019) Global landscape of the Islamic Fintech: opportunities, challenges and future ahead. COMSATS J Islamic Finance 4(2):29–53

Beauhurst (2015) The deal: making sense of UK equity investment

Cohen J (2016) A study on the history and functionality of real estate crowdfunding. Joseph Wharton Scholars. Available from http://repository.upenn.edu/joseph_wharton_scholars/19

Demirgüç-Kunt A, Klapper L, Singer D, Ansar S, Hess J (2018) The global Findex database 2017: measuring financial inclusion and Fintech revolution. In: International Bank for Reconstruction and Development. World Bank, Washington, DC

Iansiti M, Lakhani KR (2017) The truth about Blockchain. Harv Bus Rev 95(1):118–127

Jenik I, Lyman T, Nava A (2017) Crowdfunding and financial inclusion. The Consultative Group to Assist the Poor (CGAP). Available from https://www.cgap.org/sites/default/files/Working-Paper-Crowdfunding-and-Financial-Inclusion-Mar-2017.pdf

Kim H, Moor L (2017) The case of crowdfunding in financial inclusion: a survey. Strateg Chang 26 (2):193–212

Manzi J, Berezina D, Adelson M (2008) Commercial mortgage-backed securities. In: Handbook of finance. Wiley, Boca Raton, FL

Marchand F (2016) Crowdfunding real estate: institutions and markets - an institutional comparison on the growth-patterns and behavior of crowdfunding real Estate Markets in the Netherlands and United States. 15 January 2016, Delft University of Technology

Meister SB (2011) Commercial real estate restructuring revolution: strategies, tranche warfare, and prospects for recovery. Wiley, Hoboken, NJ

Mohamed H (2020) Empowering the poor and enhancing financial inclusion from a multidimensional perspective. In: Elzahi SA, Abdelrahman A, Khalifa M, Khaleequzzaman

M (eds) Enhancing financial inclusion through Islamic finance (Volume 1), Chapter 2. Palgrave Macmillan, London
Mohamed H, Ali H (2019) Blockchain, Fintech and Islamic finance: building the future of the new Islamic digital economy. De/G Press, De Gruyter
Morri G, Ravetta M (2016) Real estate crowdfunding: a financial innovation for direct property investment. https://doi.org/10.14609/Ti_2_16_1e
Niforos M, Ramachandran V, Rehermann T (2017) Blockchain: opportunities for private enterprises in emerging market. International Finance Corporation, Washington, DC
Raskin M (2013) Crowdfunding for real estate: buy a slide of a skyscraper. Bloomberg Businessweek, January 24
Vogel JH Jr, Moll BS (2014) Crowdfunding for real estate. The Real Estate Finance J Summer/Fall 2014. Thomson Reuters
Walthoff-Borm X, Schwienbacherb A, Vanackera T (2018) Equity crowdfunding: first resort or last resort? J Bus Ventur 33(2018):513–533
World Bank (2013) Crowdfunding's potential for the developing world. World Bank, Washington, DC
World Bank (2019) The digital economy in Southeast Asia: strengthening the foundations for future growth, Digital Development Partnership
Zhu Z, Zhou ZZ (2016) Analysis and outlook of applications of Blockchain technology to equity crowdfunding in China. Financial Innov 2(1):29

Chapter 8
Crowdsourcing in Higher Education: Theory and Best Practices

Varsha Agarwal, Aneesya Panicker, Avnish Sharma, Rohit Rammurthy, L. Ganesh, and Shiva Chaudhary

Abstract The widespread use of crowdsourcing strategies in higher education institutions improves the performance of students by using collective initiatives to enhance the skills of each student, efficiently optimizes the lecturing process by exchanging and pooling research materials, and also improves the financial situation of alumni by encouraging crowdfunding of tuition. We identify four main areas in this study where the use of crowdsourcing strategies plays an important role in the success of alumni in institutions of higher education. The proposed "crowd teaching" approach optimizes lecturing, allowing lecture notes to be shared and exchanged according to the various curricula of Higher Education Studies. With "crowd learning", students learn by execution on collaborative projects in which different students share (effectively) teaching each other under the guidance of the lecturer, learn the necessary skills to achieve the project's goals and solve the proposed issue. In relation to accessing funding, the tuition fees of students can be financed by crowdsourcing approaches through "crowd tuition" and even "crowdfunding" can be used to procure laboratory and classroom content or the learning stays of students abroad. Using this crowdsourcing tool, students can find assistance in paying university taxes and also have an interest in further learning with other students. The application of crowdsourcing to education allows for optimization of the institutions' budget and a more effective use of learning time, leading eventually to better outcomes for students.

V. Agarwal (✉) · S. Chaudhary
Center for Management Studies, Jain (Deemed – to – be University), Bangalore, India
e-mail: varsha_a@cms.ac.in; dr.shiva_c@cms.ac.in

A. Panicker · A. Sharma
Institute of Business Management, GLA University, Mathura, Uttar Pradesh, India
e-mail: aneesya.panicker@gla.ac.in; avnish.sharma@gla.ac.in

R. Rammurthy
Department of Management, Jain (Deemed – to – be University), Bangalore, India

L. Ganesh
School of Business and Management, Christ (Deemed to be University), Bangalore, India
e-mail: ganessh.l@christuniversity.in

R. Lenart-Gansiniec, J. Chen (eds.), *Crowdfunding in the Public Sector*,
Contributions to Finance and Accounting,
https://doi.org/10.1007/978-3-030-77841-5_8

Keywords Crowdsourcing · Higher education · Students · Crowdlearning · Community college · Online learning

8.1 Introduction

As it is not feasible for a person to retain entire knowledge concerned with a domain, the same is the case with a little group of people as well. Knowledge of high standards can be acquired by a number of people working together using ad hoc methods and tools (Anderson 2009). Crowdsourcing methods could be adopted by educational institutions for the sake of managing the task of teaching and administration, maintaining higher standards, and enabling the maximum usage of available time and connections, without spending much money on alumni, providing more opportunities to students to attend University (making a significant social contribution) (Geens 2008).

Techniques of crowdsourcing might prove to be a spontaneous learning method, despite being unable to be the best in itself when it comes to a greater educational experience. But with the help of a proper strategy, it can provide better education which may induce efficient workflow by making the most of the personalized curricula (Kneissl and Bry 2012).

Alumni performance can be witnessed being surprisingly better with the employment of crowdsourcing techniques in colleges and universities (Higher Education). An advantage of crowdsourced knowledge creation is the initiation of Collaborative ideas which can be fruitful to both entities of academics, whether students or teachers. A collection of high-quality learning materials can be stored by Instructors and the same can be accessed by students to maintain high standers of the teaching-learning process (Murillo-Zamorano et al. 2020). At the same time, students get a chance to apply varied varieties of their mental faculties to resolve a common issue mutually through crowd learning. External crowdfunding and Schemes of crowdsourced Grants could also be used for student fees. It can prove to be a boon for students to maximize their skills in form of crowdfunding their tuition or to avail the expenses of their overseas trips through the same (Laster 2010).

This paper focuses to review the requirement of platforms and software tools for crowdsourcing (Web-based, for instance) at the university level, required by the mentioned two applications.

8.2 Crowdsourcing

The phrase “crowdsourcing” is an amalgamation of two terms “crowd” and “outsourcing” representing the bifurcation of an assignment allocated to people belonging to a group. For the first time, the phenomenon called “crowdsourcing” was witnessed in Wired Magazine in the year 2006, yet several things were existing

beforehand adding to the entity of "outsource work to a group of people" (Schaffhauser 2013). Wikipedia came up as an enterprising entity in the year 2001 with a payment less platform to explore all possible information irrespective of any domain and caters to the need of around more than 500 million visitors per month. Yet in the year 1714, the British government came up with the concept of offering a prize (currently known as Longitude Prize) in form of money to one who provides a resolution to estimate the longitude of a ship ("Crowdsourcing science: Researcher uses Facebook to identify thousands of fish" 2011). The initial step of the crowdsourcing concept, where people try to resolve problems mutually, emerged this way.

Crowdsourcing does not involve web infrastructure like the definition, although a fact stating that utilizing the internet results in faster crowdsourcing which also allows access with less time and at a reduced expense to a larger range of people around the world.

With the evolution of social networking and other Internet technology, the emergence of crowdsourcing has become possible, enabling groups to come together more easily for collaborating and communicate knowledge (Stewart 2012). The thought of collaborating with individuals from the other side of the planet in the same joint effort would be impossible and would demand a massive price if we did not access the Internet.

Crowdsourcing has been used on the market in recent years to conduct a broad range of tasks, as similar to the case of mturk.com: Amazon Mechanical Turk, which is more complicated to be computed but is solvable. The capacity to draw a crowd allows for huge simultaneous processing that can result in high output from processes like image identification, categorization of items and audio transcription and crowdsourcing emerges as a viable choice open to anybody with a mission or initiative in mind with a rise of the parallel solving networks present online (Young 2009). Web services like Wikipedia offer ample proof that it is feasible to co-ordinate a crowd with challenging activities. In addition to Wikipedia, there are a broad variety of examples of group crowdsourcing, notably for language learning, which are also discussed further in the present chapter.

The idea of parallelization of the tasks is focused on simplistic method partitioning as well as allocation has developed into more advanced processes for solving problems. It is necessary to complete complicated operations, for example, programming assignments, with rightly coordinated problem-solving. (Alonso 2011), for instance, built a crowdsourcing network named Turkit that encourages applicants to compose programs performed on Mechanical Turk by human staff. The crowdsourcing approach in this case is focused on the separation of the proposed issue into tiny bits that will be coded by multiple employees. Indeed, one of the key benefits of crowdsourcing is that it encourages multiple entities to create iterative contributions (Hochberg 2010).

Collecting suggestions regarding a specific subject and deciding on the most successful alternative is amongst the most typical application scenarios for the platforms of crowdsourcing. As a free and accessible forum where anyone can view information and read and share views, crowdsourcing systems can be

introduced, but the network can still offer security for concepts where only registered members can access information. Under these situations, an association or industrial corporation that presents an award for the best approach to the proposed mission is typically funded by a challenge proposed here (Kuzminska 2016). With the help of this model involving competition helps us in accessing a variety of ideas, particularly for medium and small businesses, which will not be accessible under a normal environment or will entail a substantial investment in engaging external single or multiple providers (Nehls and Livengood 2017). The biggest attraction for the business with the usage of a bidding site for crowdsourcing is that, in certain situations, this choice is considerably less costly than contracting with a conventional firm, for example, a branding department to plan a design of the product logo or an expert on communications for an advertisement strategy proposal.

Under the following segment, we would explain all benefits of crowdsourcing relevant to activities in higher education.

8.3 Methods of Crowdsourcing in Higher Education

The latest research and initial applications submitted to universities and colleges depict that for both students and teachers, the application of crowdsourcing into education could be fruitful. Students will prefer to pursue customized instruction in line with their skills and manner of learning (Hills 2015) and it is a waste of resources for professors to repeat the same lectures over and over. The teachers will be able to prepare lessons of higher quality and can offer useful guidelines in higher education classroom by properly using the concepts of crowdsourcing, and students could access and improve their learning efficiency with the best learning material.

Crowdsourcing-oriented evaluation techniques have previously been used on a smaller scale in Higher Education, such as evaluating the peers where the teachers ask their students for evaluating the work of one another. There also exists some research that has shown that peer-grading crowd-sourcing methods can result in more precise evaluations of the performance of the student by merging different views with various expertise and perspectives (Garrigos-Simon 2015).

For the last 10 years, online learning has grown dramatically with the advent of Web technology, utilizing adaptive environments of online learning that promote social learning (Eklund et al. 2019). Online tutoring services have, for instance, made significant strides in higher education in recent years (Wen and Lin 2015). In the success of graduates of higher education organizations, there are four main fields where implemented crowdsourcing methods play a major role:

- Crowdteaching: The lecturing workers exchange and bring together lecturing resources in line with university curricula in this method.
- Crowd learning: This strategy of crowdsourcing depending on the "learning by project lecturing scheme." In American and European universities, this scheme has been successfully implemented. The information building mechanism in the

crowd learning approach is focused on collective projects through which various students share, actively educate each other, and collectively develop the skills required to achieve the project objectives.

- Crowdtuition: For social gain, crowdsourcing has a significant impact. Crowdtuition techniques allow tuition fees for students with higher performance to be financed by crowdsourcing techniques. Various experiences, including Spain's Universitat Politècnica de València (UPV), have been developed in recent years.
- Crowdfunding: Higher education teaching requirements, in particular in studies under engineering departments, which includes a significant investment in both classroom and laboratory materials. Under public organization, the inventory apparatus of laboratories is difficult to obtain in case the materials are funded typically by the government. Laboratories working on Crowdfunding lecturing is another interesting method which can be followed for allowing the organizations in addressing specific topics such as cancer research, to be lectured for the benefit of the society.

The various crowdsourcing techniques are described in detail further that are related to the functioning of higher education institutions in this chapter.

8.3.1 Crowd Teaching

Educational content sharing in universities and colleges is considered the most commonly used way of crowdsourcing. Professors are searching for good quality teaching content that could easily teach the topics of a specific program. But for using the trusted material originating from outlets with a prestige behind it, intense attention should be given. This is also an issue that students encounter while looking for knowledge on the Internet when they depend on untrusted outlets in certain situations, which contributes to confusion and interferes with the goals of learning. UClass (http://www.uclass.io) should be seen as a Popular Core content portal in this case, where college and university professors could exchange their expertise with all of the professors from other institutes. Professors could access the right instruction around their districts using crowdsourcing preparation for driving higher student results. Amongst the key aims of the UClass repository is the sharing of learning materials of high-quality to save time for teachers in scheduling their classes. The class also provides interactive features for students in multiple areas of the world to collaborate. The "Latin American Open Textbook Initiative" was founded in 2011 with a primary aim of disseminating open cooperative higher education textbooks (customized by region) for avoiding the increasing costs of textbooks in Latin America. Along with Wikibooks and Links networks, among others, this is an example that has been found to dramatically minimize (up to 80%) the cost of student textbooks (Phelan 2014).

8.3.2 Crowd Learning

Through the development of educational sites like Skillshare (http://www.skillshare.com), crowd learning has emerged. It is an online learning network developed by project-based courses to master real-world skills. "Crowdlearning" may therefore be described as learning with the involvement of many students ("crowd") via real-case projects. To collect various talents, the value of this approach is focused on every student to recommend abilities which they have, which would be helpful to achieve the ultimate aim of this project.

The students exchange knowledge and skills while designing the proposal, which is immediately acquired when developing the project tasks. Then, it is necessary to provide a forum to successfully suggest several required skills that can match the competencies set out in the curriculum for lecturing. In this context, in the crowd-learning management framework, a categorization of competencies can be enforced. After creating the project through crowd-learning, all students exchanged their expertise and competencies, learning the competencies of others successfully.

For the development of joint ventures, many online platforms are open. Crowd-learning sites provide online classes which the students could take as per their learning abilities. It is evident nowadays that delivering an online course will draw several students to this platform. Duolingo, a free science-based language education app with over 38 million students, offers a simple illustration. Duolingo has been another famous platform used to learn languages online in only 2 years and TechCrunch has recently selected it as the Best Education Start-up and iPhone and Android App of the Year 2013. A total of 34 h of Duolingo is equal to a complete university semester of language education (Palmer 2014), as per an academic study undertaken by the University of South Carolina and the City University of New York. This research indicates that Duolingo is highly successful than the average course of a university, as a one-semester course of university typically requires more than 34 h of work.

Proper research will stress the monitoring of students and spot uncertainty in some subjects. Coursera, for instance, analyses the traces of the respondent to decide which videos are seen again and even in what sequence, helping to refine the program and query routing (Brabham 2008). The curriculum design of online courses, presented by Coursera, Khan Academy, and Udacity, is already usually centralized, but Wikipedia's great performance shows that enormous opportunities can be generated through the intervention of an entire population. Huge accessible online courses (MOOCs) providing topics required by their users are currently delivered by a growing range of universities, for instance. In most instances, owing to the lack of coherence of the program design, Open Educational Tools (OER) had minimal effect and attractiveness to students (Lundberg 2012). In comparison, MOOCs follows a structured strategy where a full and more cohesive course is planned by the university (basically colleges and universities). Those classes are found on several campuses in mixed classrooms. The key attraction of MOOCs is that they are generally taught by top professors and typically involve

pedagogues focused on studies, such as productive learning, positive learning, and mastery-learning (Bhatti et al. 2012). The centralization of the planning and design of the MOOCs allows it easier to utilize more and better-quality tools than conventional courses per session. Previous research indicates that well-designed MOOCs may contribute to the learning and high satisfaction levels of high-quality students (Yusoff et al. 2018).

The potential of YouTube to target a different demographic has in addition to these online learning channels, rendered it one of the biggest media for groundbreaking instructional programming. The YouTube online channels 'Crash Course' and 'SciShow' created by Green Brothers are direct examples of this. One of the 100 initial channels of the $100 million original channel initiative on YouTube was Crash Course (Zahirović Suhonjić et al. 2018). This project was a 100-million-dollar program to add novel material to YouTube, sponsored by Google. The initial channel project was also planned to kick-start Google TV. For example, "Crash courses" is a YouTube instructional channel for global culture, genetics, literature, nature, and chemistry online instruction. The YouTube channel "Crash Course" has received over 2.4 million viewers and more than 160 million video views as of December 2014. This popular adoption of online instructional videos has drawn the interest of advertising content on television. As a recent illustration, a Crash Courses collaboration with PBS Digital Studios were revealed to extend the channel in November 2014 (Zuchowski et al. 2016).

8.4 Crowdfunding Educational Infrastructures

To maximize donations to help a specific purpose, a supplemental application of crowdsourcing may also be implemented. This idea is often referred to as "crowdfunding." It is also viable to collect educational funds and there are already many online crowdsourced funding landscapes that offer educational resources. Crowdfunding will also gain from the substantial expenditures needed to acquire and upgrade the facilities in labs and classrooms in higher education. The government typically pays the expense of public schools' classroom supplies, although it is more complicated to secure finance for technical facilities or laboratory inventory materials. Lecturing labs for crowdfunding is an important choice for enhancing science at higher education centers (Ramonsito 2020).

Crowdfunding may also be used to promote student stays abroad. Because it is challenging to obtain college travel scholarships or educational travel grants, some platforms for crowdsourcing have emerged as a successful alternative to pursue support. IndieGoGo is an illustration of crowdfunding sites that the campaign will be accessed for anybody aged 13 years old and that for example, an undergraduate summer abroad curriculum is approved for sponsorship and even small contributions that may assist the student's journey (Hills 2015).

8.5 Conclusion

This chapter presents a detailed guide to the developments that can be made to colleges and higher education organizations through the use of crowdsourcing strategies. In which crowdsourcing will play a key role, four key issues are identified: firstly, "crowd teaching" is suggested to optimize lecturing by distributing and exchanging lecture content. Ad hoc platforms are required by crowd teaching for sharing exchange and share of material related with lectures which follow Higher education studies and its different curricula (Agrawal et al. 2015).

Collaborative projects developed principles of execution and are considered as the basis for "Crowdlearning". Here all students help in providing different skills which are required to solve the entire proposed problem. All students teach each other and share their ideas which helps them in preparing for their careers.

"Crowdtuition" is an effective method where fees of students are publicly funded and are used by high-ranking alumni. "Crowdfunding" is also used for supporting students' expenses for classroom and laboratory materials.

Crowdsourcing techniques and their application in higher education will assist in optimizing curricula and increase the effectiveness of learning workflows which will bring better results for students.

References

Agrawal S, Chen C, Tanio C (2015) Crowd-sourcing delivery system innovation: a public–private solution. Healthcare 3(1):2–4. https://doi.org/10.1016/j.hjdsi.2014.08.002

Alonso O (2011) Perspectives on infrastructure for crowdsourcing. http://ir.ischool.utexas.edu/csdm2011/proceedings/csdm2011_alonso.pdf . Retrieved 19 December 2020

Anderson T (2009) Distance learning in higher education: a programmatic approach to planning, design, instruction, evaluation, and accreditation. Int Rev Res Open Distributed Learn 10(1). https://doi.org/10.19173/irrodl.v10i1.682

Bhatti N, Ali A, Syed SG, Maitlo G, Shaikh F (2012) New trends in higher education and challenges and emerging opportunities in business education. Asian Soc Sci 8(7). https://doi.org/10.5539/ass.v8n7p86

Brabham D (2008) Crowdsourcing as a model for problem solving. Convergence 14(1):75–90. https://doi.org/10.1177/1354856507084420

Crowdsourcing science: Researcher uses Facebook to identify thousands of fish (2011). https://www.sciencedaily.com/releases/2011/05/110513204526.htm. Retrieved 19 December 2020

Eklund L, Stamm I, Liebermann W (2019) The crowd in crowdsourcing: crowdsourcing as a pragmatic research method. First Monday. https://doi.org/10.5210/fm.v24i10.9206

Garrigos-Simon F (2015) Advances in crowdsourcing. Springer, Cham

Geens S (2008) King's College London starts KML crowdsourcing projects. https://ogleearth.com/2008/02/kings-college-london-starts-kml-crowdsourcing-projects/. Retrieved 15 December 2020

Hills T (2015) Crowdsourcing content creation in the classroom. J Comput High Educ 27(1):47–67. https://doi.org/10.1007/s12528-015-9089-2

Hochberg S (2010) PolitiFact - Hochberg says only one third of Texas college students graduate. https://www.politifact.com/factchecks/2010/jul/13/scott-hochberg/hochberg-says-only-one-third-texas-college-student/. Retrieved 19 December 2020

Kneissl F, Bry F (2012) Metropolitalia: a crowdsourcing platform for linguistic field research. https://www.pms.ifi.lmu.de/publikationen/PMS-FB/PMS-FB-2012-14/PMS-FB-2012-14-paper.pdf. Retrieved 15 December 2020

Kuzminska O (2016) Crowdsourcing and higher education. Open Educ e-environ Mod Univ 2:20–26. https://doi.org/10.28925/2414-0325.2016.2.c2026

Laster J (2010) A swarm of volunteers, a honey of an idea. https://www.chronicle.com/article/a-swarm-of-volunteers-a-honey-of-an-idea/. Retrieved 15 December 2020

Lundberg T (2012) Learning to innovate in twenty-first-century community colleges: searching for the general education niche in two-year colleges. New Direct Commun Coll 2012(157):83–95. https://doi.org/10.1002/cc.20008

Murillo-Zamorano L, Ángel López Sánchez J, Bueno Muñoz C (2020) Gamified crowdsourcing in higher education: a theoretical framework and a case study. Think Skills Creat 36:100645. https://doi.org/10.1016/j.tsc.2020.100645

Nehls K, Livengood J (2017) Facebook, crowdsourcing and the transition to college. J Furth High Educ 42(3):366–376. https://doi.org/10.1080/0309877x.2017.1281885

Palmer J (2014) Budgeting approaches in community colleges. New Direct Commun Coll 2014 (168):29–40. https://doi.org/10.1002/cc.20118

Phelan D (2014) The clear and present funding crisis in community colleges. New Direct Commun Coll 2014(168):5–16. https://doi.org/10.1002/cc.20116

Ramonsito B (2020) Crowdsourcing technology for classroom learning. Int J Adv Trends Comput Sci Eng 9(4):5103–5110. https://doi.org/10.30534/ijatcse/2020/133942020

Schaffhauser D (2013) Crowdsourcing Innovation on Campus—Campus Technology. https://campustechnology.com/articles/2013/02/07/crowdsourcing-innovation-on-campus.aspx. Retrieved 15 December 2015

Stewart H (2012) Crowd to choose digital media winners. http://dev.utahbusiness.com/articles/view/crowd_to_choose_digital_media_winners. Retrieved 19 December 2015

Wen Z, Lin L (2015) Optimal fee structures of crowdsourcing platforms. Decis Sci 47(5):820–850. https://doi.org/10.1111/deci.12201

Young J (2009) Colleges try 'crowdsourcing' help desks to save money. https://www.chronicle.com/article/colleges-try-crowdsourcing-help-desks-to-save-money/. Retrieved 19 December 2015

Yusoff H, Baba J, Ariffin S, Embong R (2018) Quality academics in higher education: mapping the key components. Int J Asian Soc Sci 8(11):948–957. https://doi.org/10.18488/journal.1.2018.811.948.957

Zahirović Suhonjić A, Despotović-Zrakić M, Labus A, Bogdanović Z, Barać D (2018) Fostering students' participation in creating educational content through crowdsourcing. Interact Learn Environ 27(1):72–85. https://doi.org/10.1080/10494820.2018.1451898

Zuchowski O, Posegga O, Schlagwein D, Fischbach K (2016) Internal crowdsourcing: conceptual framework, structured review, and research agenda. J Inf Technol 31(2):166–184. https://doi.org/10.1057/jit.2016.14

Chapter 9
Crowdfunding in Universities as an Alternative Way of Financial Support in Research

Konstantinos Kalemis

Abstract The so-called 4th Industrial Revolution and the Information Age have made your Computers and Digital Technology the ultimate means of solving chronic problems. The rapid developments in the field of technology are impressive and we can now confidently say that there is no sector in life that does not involve computers. The financial sector could not be the exception, and even at a time when banks are plagued by a prolonged crisis, the Internet and IT solutions are not only coming to support the banking industry, but we would say, they are coming to replace traditional banking products, such as loans. Crowdfunding, taking advantage of the interactivity of the Internet, has evolved into a unique global phenomenon, where through online platforms; one seeks funding, from the ordinary world—ordinary internet users.

Keywords Academic research · Crowdfunding platforms · Democratization of investment · Researchers financing

9.1 Introduction

The funding of scientific research has always been one of the major obstacles to the progress and development of research within universities. Governments in developed countries, recognizing the importance of research work, fund universities for studies. Through research and innovation, growth and employment are promoted, and important social problems are also resolved (Tabak et al. 2018).

The aim of the article is to highlight and comment on the concept of crowdfunding as by funding innovative ideas in academic research. The phenomenon of crowdfunding as a whole is presented, analyzing the innovations offered by crowdfunding platforms and the real effect of this phenomenon is the creation in

K. Kalemis (✉)
National Centre for Public Administration and Local Government, Attiki, Greece
e-mail: kkalemis@primedu.uoa.gr

R. Lenart-Gansiniec, J. Chen (eds.), *Crowdfunding in the Public Sector*,
Contributions to Finance and Accounting,
https://doi.org/10.1007/978-3-030-77841-5_9

recent years of a new form of funding (Wang 2002). Dominantly, however, the advantages and disadvantages arising from the creation of a crowdfunding platform that works exclusively to finance research are being studied.

9.2 Crowdfunding as a Financial Tool

In recent years and through the rapid increase in Internet transactions, the idea of crowdfunding has been born. As a business model, crowdfunding has multiple advantages compared to more conventional funding models. Some apply more to researchers/entrepreneurs and others more to investors and sponsors. Of course, some advantages apply and favor both (Hill 2020). Wanting to be more specific, crowdfunding describes the financing of a project through "investments" made by Internet users. But in addition to the money they can raise by presenting their idea on a crowdfunding platform, the visibility they receive is great and helps advertise their companies, making the crowdfunding platform among other things a great marketing tool (Hemer 2011). As a result of all these factors, crowdfunding is a very flexible way of financing especially for the early stages of a project while adapting more easily to changing needs especially compared to traditional funding models. Thus, the total amount collected by the users who financially supported the project, constitutes the initial capital for the implementation of the project and often the "small investors" are rewarded for this investment. A few years ago, the banking industry was in very high growth; so many would-be entrepreneurs could easily raise the necessary capital through bank lending to realize their business idea (Lee et al. 2019). But the huge economic crisis, and in particular the crisis in the financial system since 2008, is perhaps the key factor in spreading the concept of crowdfunding and the attention it has received from the scientific and business community in recent years (Li-Ying et al. 2018). The search for funds through the crowd has not occurred in recent years but there are recorded relevant methods in the past. This will focus on its updated expression which is interwoven with the evolution of the online social web and is called Crowdfunding. Compared to the more traditional ways of funding, crowdfunding is a much faster process for the public to fund you. In fact, in the past, one may have sought funding in the traditional ways and despite the time-consuming of the case; it failed, ultimately remaining without capital for the project having even wasted a lot of time and money (Forbes et al. 2020). Because in the past it was a standard procedure for someone who needed funding to approach their initials, friends or well-known investors, presenting a plan of their work or even a complete investment plan. Perhaps they needed to contact lawyers or "*business angels*" but also to spend a period of long waits and meetings with investors, until the final audit of all the evidence they submitted to prospective investors and their final decision to finance them (Jensen and Özkil 2018). Crowdfunding is a feature of a new kind of collaborative economy and a new source of capital for entrepreneurs, aimed at filling the gap caused by the financial crisis and the inability of the traditional funding regime to support entrepreneurship. Below is a

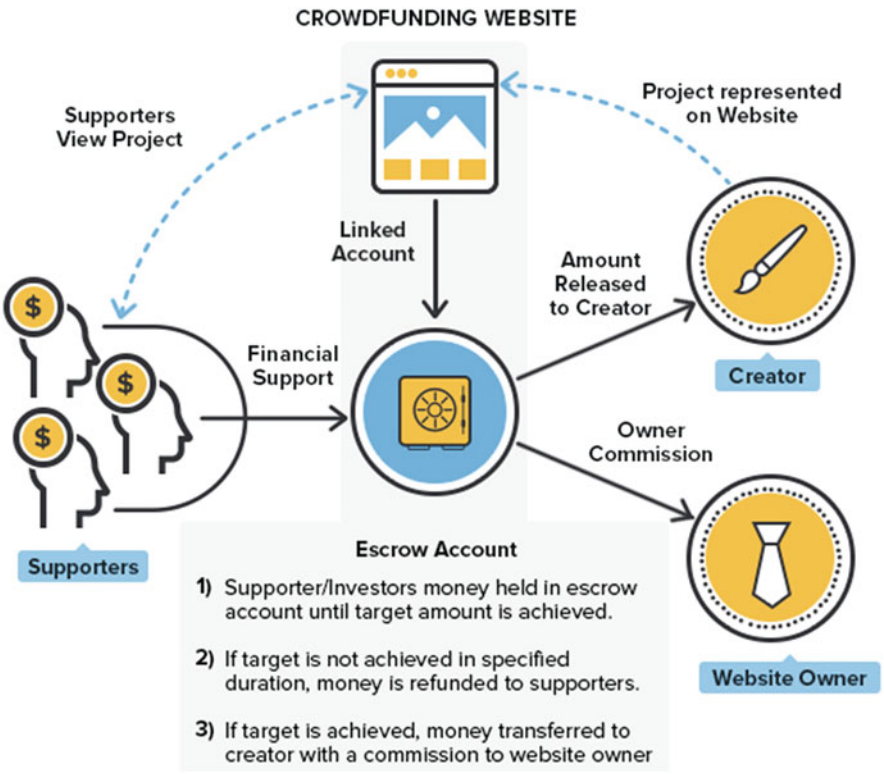

Fig. 9.1 How to find the suitable crowdfunding platform (Source: Google Scholar)

diagram showing the key-points to find the most suitable crowdfunding platform (Fig. 9.1).

In this method, entrepreneurs, professionals, investors, but also anyone who wishes to raise capital resources for the implementation of a project, through the relevant online platforms, can appeal (Daudelin et al. 2020). Crowdfunding platforms are open markets, structured to connect social and business networks, while pairing between parties does not require pre-existing relationships and there are no strict selections or exclusion criteria. The networks, which come together, are open and volatile as they are constantly formed on the basis of emerging needs and are based on non-hierarchical, informal and temporary links. More specifically, the funding applicant uses social media and specialized platforms to organize the campaign to promote its action, service or product, through which it will attract many funders by offering them a variety of benefits. The success of this is judged by attracting as many funded as possible, where each will contribute a low financial price. Some of the world's most successful crowdfunding platforms are (Kuile 2011): (a) Kickstarter, (b) Indiegogo (with its significant differentiation from other platforms that it is not necessary to have raised all the money of the original goal, in

order to be able to receive the amount invested for your project), (c) Crowdfunder, a platform that enables you to become a shareholder in the crowdfunding company, (d) Gambitious (specialized in the financing of electronic games, but with creators having to submit a regular business plan and (e) AngelList (mainly for tech start up with Business Angels, use crowdfunding to fund new start uppers). By contrast, with crowdfunding the process is much simpler and faster. Someone registers their application online on the crowdfunding platform and the platform makes an initial pre-approval for the project. Then, they create the interested party, an online profile and begin to run the online crowdfunding campaign for the project. Thus, almost immediately, a project can receive money from any interested investor. In fact, in this effort, the person concerned will not be alone but they can use all the tools and assistance available on the crowdfunding platform. But even if, directly, a project fails to be funded, all the elements and details are on the crowdfunding platform, so that if someone is interested in investing, they can do it easily, thus acting as a "one-stop shop" for investors. After all, this is a great advantage and help for investors looking for opportunities. They have the ability, easily and quickly, through their computer screen and online crowdfunding platforms, to search for the idea/project that they find most interesting and attractive to invest and that suits their culture and wants, while, it can easily see and learn, who else has invested, in this project. So, if there are some well-known investors who trust their judgment, you can very easily follow their investments on crowdfunding platforms. Another advantage for investors is that one can look to invest in many different projects at the same time, looking for opportunities on crowdfunding platforms. Thus, it saves very important time, which in the traditional ways those investors have operated until now, would have been wasted on multiple phone calls and meetings. It is also quite difficult for an innovative but young entrepreneur to be able to find and reach out on their own, interested investors for their project. Crowdfunding platforms bring you in touch with thousands of investors looking for opportunities in interesting projects. Crowdfunding platforms also offer consulting assistance that can be particularly valuable in the early stages of the project, and that enables the entrepreneur to work inextricably on the main work of the project. After all, financing the project can be a very time-consuming process, which also creates stress, not letting the entrepreneur work on their idea. Help offered by a specialized crowdfunding platform can prove quite useful (Maas et al. 2020). But a crowdfunding platform can also be a valuable marketing tool, as a crowdfunding campaign already offers significant publicity to create a strong brand name. In addition, it offers legal services and assistance, which in different cases are particularly costly for a startup (Macdonald 2006).

9.3 Crowdfunding for Scientific Research

It is widely accepted that the degree of country development is reflected in the quality of education provided in that country. A country's development perspective and future are inextricably linked to what education a country provides. And the

quality of education is largely reflected in its Universities and in particular in the research produced within them (Madden et al. 2018).

However, without the necessary funding, accompanied even by proper political management of these costs, it is impossible to develop higher education. Internationally, the sources of funding of an institution are a combination of (a) state grants, (b) tuition fees, (c) private sponsorships and (d) business income of the institution.

One view that is wrongly heard has to do with how only projects of exceptional public interest (e.g., medicine to fight a disease) are funded through crowdfunding. However, the subject of research does not matter for the success of crowdfunding. What matters is how many people will eventually get involved with the project by funding it, because all projects can potentially become interesting to the public. The characteristics of crowdfunding funding are such that they can provide the necessary financial support both to qualified and internationally recognized scientists, as well as to young scientists. All they have to do is convince the public that their research deserves to be funded.

Funding research projects through crowdfunding, we believe is at an early stage even that with concerted efforts, it is only a matter of time before researchers are able to attract ordinary people, ready to finance their projects.

The word "*crowd*" in the first part of the word crowdfunding is a point to be explained for the whole process of funding a scientific research, because when scientists have to present their ideas on social media, like all other entrepreneurs, they usually do not present some impressive advertising campaign, for a shiny new product, but the results of their research studies. When scientists have to present their ideas on social media, like all other entrepreneurs, they usually don't present some impressive advertising campaign for a shiny new product, but the results of their research studies.

In no way, of course, does it mean that scientific research funded through crowdfunding is all of questionable quality. After all, the majority of those looking to fund crowdfunding research are recognized scientists themselves. As long as scientific communities adhere to certain international standards, low-level research work will not be published on crowdfunding platforms and the funding of such research will remain at very low levels (as it should be).

9.4 How Crowdfunding Will Enhance Scientific Research

I believe that despite its widespread acceptance, crowdfunding will not replace conventional ways of funding scientific research. One view that is wrongly heard has to do with that only projects of exceptional public interest (e.g., medicine to fight a disease) are funded through crowdfunding. The characteristics of rising funds through crowdfunding, are such that they can provide the necessary financial support both to qualified and internationally recognized scientists, as well as to young scientists. All they have to do is to convince the public that their research deserves to be funded. I believe that small projects, especially in theoretical research that may

not require as much equipment and extra staff costs, will take even more advantage of crowdfunding.

More generally, there is no doubt that securing funding is a vital part of a researcher's work. However, although over time it has not been easy for researchers to request and receive money for their scientific thesis, the ongoing global financial crisis has made things even more difficult, especially for researchers in the early stages of their careers. Faced with widespread cuts, universities and funding bodies have less money to distribute, so it is no wonder why they choose to fund only a few scientists who are already established rather than pursue experimental funding, new scientists and new experimental research (Markowitz 2013).

This is why there is an increasing trend in crowdfunding research, where scientists (even scientists from large institutions with a tradition of research) have turned to the interest of the ordinary world. And the public seems to be really willing to take on this more active role in research by filling the funding gap by not only wanting to fund research but also to follow more actively, participating through various scientific programs aimed at citizens (citizen science projects).

Such actions are intended to discuss some of the most common questions that researchers have around crowdfunding, such as what the funding opportunities are open to them, the rules they have to keep in order to succeed, what research has been funded and what best practices are to achieve the goal.

Reaching out to the ever-growing, so-called citizen scientists is also a great way to enhance the effectiveness of a crowdfunding campaign. In addition to financial support, it can contribute in other ways, offering other important support to the research program.

There are certainly many grey spots, especially in terms of the ways in which research center institutions (Strom et al. 2020), regulators, scientific journals and the research community generally see "crowdfunded" research spreading, but as more and more projects are funded in this way and researchers demonstrate that the funding method does not automatically mean less stringent scientific standards, it is very likely that crowdfunding will become a more common means of funding scientific research.

Initially, all crowdfunding-funded scientific projects differ from projects funded in traditional ways, and this lies in the fact that research itself is structured as it is structured and crowdfunding. The results and objectives of the research are not made public after the completion of the survey, but it is necessary to approach the public from the initial stage of the research, because it is the public that will ultimately fund the research. It is therefore understood how important it is for the general public to be interested in a research project, because this will also mean that there will also be interest in funding it through crowdfunding. According to Maj (2008), it is clear that many people believe that a crowdfunding platform serves to raise funds for a research plan and it is not a way to collect donations, like scholarships to doctoral students.

The main point of a successful crowdfunding campaign to fund scientific research is ultimately to create a multitude of people who are interested in this research and are willing to fund it.

Therefore, the publication and visibility of research and its expected results are essential elements in the financing of researchers through crowdfunding. In fact, the campaign and the requirements for project visibility are much greater than the visibility required by the traditional ways of granting university research. At this point, perhaps some people think it is a waste of a scientist's precious time, because instead of staying committed to their research, they should try to establish links with the public, that is, their potential funders. But even given that the time for public promotion of the project is much longer than the time it takes a researcher to apply for a scholarship and to be funded in the traditional ways, the prospects for funding from the general public are so great that the disadvantage automatically becomes an advantage. After all, this reverse process, where you first reach out to the public and make the details of the research known and then carry out the research, has another important advantage besides the limitless prospects of funding. The researcher creates constant communication and some relationship with the interested public, an audience that can now be so enlarged and differentiated that it transcends academic boundaries.

So, the more the public attracts a survey and the more the "crowd funder" is interested in the development of the project, the more money the researcher will raise. Therefore, there should be an ongoing effort to contact a researcher–audience. However, even researchers who do not devote time to projecting their work may have a more limited audience to fund them, but this presupposes the result of research leading to the solution of a problem of direct interest to the public investing in the project, such as the creation of a drug to fight a disease or an invention that would help the evolution of humanity.

There are many platforms that a researcher can publicize their project in pursuit of a crowdfunding campaign. Most of these websites are similar in design and structure, with the main differences being presented in the terms and procedure followed by someone who is going to ask for funding. One difference with traditional financial donation is that due to the speculative nature of most websites, no tax relief is offered to donors/investors, although of course there are exceptions.

One of the main features of some platforms is that if the amount targeted at the start of the crowdfunding campaign is not raised, then it receives no funding at all, thus leaving the researcher without any resources and the public without having finally invested the amount initially deposited. This term is known as "*all-or-nothing funding*", i.e., "*all or nothing*". Of course, there are also some platforms that allow the financing of the project even if not all the money that was set as a goal is raised. The now well-known crowdfunding platforms Indiegogo and Kickstarter have a lot of traffic and thus offer the possibility of great visibility to a prospective audience interested in investing in projects. However, it should be stressed at this point that the most important factor in the financing of the project is not the platform itself, but the world that the project's research team will be able to attract. From the above it is clear that the chances of a project reaching the initial goal it had set for its financing depend on the successful campaign that is being made in order to make the project known to the general public, as this means more prospective investors which translates into more money for the implementation of the research project. Modern social

networking platforms (Facebook, LinkedIn, Twitter, blogs) are first-class tools for the researcher to reach prospective investors, but also to open a channel of communication with the general public in order to know the objectives and intended results of the research project. Crowdfunding platforms usually provide 2 ways to project a project: a text describing the project and a short video. The text is used to make public its objectives and research to be done, while the video helps more the public know the research team and their work.

Both in the text and in the video, it is good to avoid the extensive use of scientific terminology, presenting the research work in the simplest way possible, while at the same time showing the interested public part of the creativity and passion they have for the project. The last detail is particularly important because, if the researchers show their enthusiasm for their research project, the chances of attracting an audience willing to support the project increase. It is therefore understandable the great importance of video in the whole process of seeking crowdfunding funding for research purposes (Mitchell 1993).

Investors in crowdfunding platforms usually invest in seeking some kind of return on their investment. For example, technological or artistic projects funded through crowdfunding, reciprocate financial support with consideration such as a version of the software they created or tickets to the artist's performance.

The issue that arises, however, is that research projects very often do not produce tangible products, but intangible theorems, algorithms and generally scientific research products without utilitarian value for a simple human being. But as one of the purposes of retribution is to make the "investor" feel that he is involved in scientific research, exchanges that create more personal ties with the researchers, would have a great response to the "investors". Such rewarding considerations could be some frequent updates on the course of research, or invitations to scientific lectures, a dinner with researchers or visits to the laboratories where the research is conducted.

9.5 Conclusion

The completion of research funded by ordinary people is nothing but the beginning of a cooperative relationship between the researcher and the public. Scientists who devote time to maintaining these bonds and cultivating new contacts with other worlds are very likely in the future to be refinanced by the public for future research. In fact, one of the prospects that crowdfunding offers, is not just financial support, but opportunities to promote research work. The visibility that research work can receive through this peculiar funding model is enormous, compared to what has been happening so far, where scientific research usually never piques the interest of the ordinary world (Nease et al. 2018). This distance between researchers and the ordinary world is both the root cause and the result, at the same time, of not understanding the work of researchers from the ordinary world. Among other things, crowdfunding can reduce this gap between researchers and the public, making the

societies specialized knowledge about the projects that interest them, (from the early stages of research), but also by creating links and a channel of communication between researchers and the ordinary world.

A big issue that always comes to light when the debate on the funding of research in universities begins is who should finance scientific research: the state, non-profit organizations or corporations. One of the arguments used by the proponents of research that will be cut off from companies is that companies will fund research directly and will not be the scientist, independent to offer with their research to the public, but will study issues that their financier has entrusted to them. On the other hand, it is not easy for a state to finance all research.

Therefore, the publication and visibility of research and its expected results are essential elements in the financing of researchers through crowdfunding. In fact, the campaign and the requirements for project visibility are much greater than the visibility required by the traditional ways of granting university research. At this point, perhaps some people think it is a waste of a scientist's precious time, because instead of staying committed to their research, they should try to establish links with the public, that is, their potential funders. The researcher creates constant communication and relationship with the interested public, an audience that can now be so enlarged and differentiated that it transcends academic boundaries.

But crowdfunding enables scientific projects that attract the interest of the public (or even the interest of companies) to be funded through crowdfunding platforms. This discharges a significant proportion of the State which is until now the only funding body for scientific research and will be able to allocate resources and invest in less "commercial" but major projects.

References

Daudelin D, Ruthazer R, Kwong M, Lorenzana R, Hannon D, Kent D, Selker H (2020) Stakeholder engagement in methodological research: development of a clinical decision support tool. J Clin Transl Sci 4(2):133–140

Forbes H, Han J, Schaefer D (2020) Using crowdfunding as part of the product development process. Proceedings of the design society: design conference 1:1245–1254

Hemer J (2011) A snapshot on crowdfunding, Arbeitspapiere Unternehmen und Region, No. R2/2011, Fraunhofer ISI, Karlsruhe

Hill K (2020) Research creativity and productivity in political science: a research agenda for understanding alternative career paths and attitudes toward professional work in the profession. Polit Sci Politics 53(1):79–83

Jensen L, Özkil A (2018) Identifying challenges in crowdfunded product development: a review of Kickstarter projects. Des Sci 4:E18

Kuile FAT (2011) The state of crowdfunding: a review of business models and platforms. Master's thesis, Universiteit van Amsterdam

Lee C, Nguyen A, Haroz E, Tol W, Aules Y, Bolton P (2019) Identifying research priorities for psychosocial support programs in humanitarian settings. Global Mental Health 6:E23. https://doi.org/10.1017/gmh.2019.19

Li-Ying J, Zhang Z, Long Q (2018) An alternative way to make knowledge sharing work in online communities? The effects of hidden knowledge facilitators. Manag Organ Rev 14(4):781–825. https://doi.org/10.1017/mor.2018.48

Maas J, Hoffman M, Wright J (2020) 4116 comprehensive training and support for research professionals at the University of Minnesota. J Clin Transl Sci 4(S1):58–58. https://doi.org/10.1017/cts.2020.204

Macdonald A (2006) Financial support and conflict of interest. Br J Psychiatry 188(3):294–294. https://doi.org/10.1192/bjp.188.3.294-a

Madden G, German Mesner I, Cox H, Mathers A, Lyman J, Sifri C, Enfield K (2018) Reduced *Clostridium difficile* tests and laboratory-identified events with a computerized clinical decision support tool and financial incentive. Infect Control Hosp Epidemiol 39(6):737–740. https://doi.org/10.1017/ice.2018.53

Maj M (2008) Non-financial conflicts of interests in psychiatric research and practice. Br J Psychiatry 193(2):91–92. https://doi.org/10.1192/bjp.bp.108.049361

Markowitz E (2013) 22 crowdfunding sites (and how to choose yours) article issue of INC

Mitchell C (1993) Research into alternative treatments. Psychiatr Bull 17(9):566–566. https://doi.org/10.1192/pb.17.9.566-a

Nease D, Burton D, Cutrona S, Edmundson L, Krist A, Laws M, Tamez M (2018) "Our lab is the community": defining essential supporting infrastructure in engagement research. J Clin Transl Sci 2(4):228–233. https://doi.org/10.1017/cts.2018.325

Strom T, Haugstad G, Shu J, Seshadri R (2020) Shared instrumentation facilities: benefiting researchers and universities and sustaining research excellence. MRS Bull 45(5):331–335

Tabak R, Proctor E, Baumann A, Morshed A, McKay V, Prusaczyk B, Kryzer E (2018) 2346 development of toolkits to support for researchers integrating dissemination and implementation science into their translational research. J Clin Transl Sci 2(S1):54–54

Wang S (2002) A universal framework for pricing financial and insurance risks. ASTIN Bull 32 (2):213–234

Chapter 10
Success Prediction of a Crowdfunding Project in Art Categories

Cem Gürler and Mehmet Çağlar

Abstract Crowdfunding is a trending topic that expresses an alternative financial source for entrepreneurs. There are several crowdfunding platforms worldwide and a huge number of projects targeting to collect the required amount of money for starting up innovative ideas. This paper is expected to guide project owners who makes online calls to collect funding. It serves this purpose by identifying explanatory attributes that brings success to a crowdfunding project, predicting outcomes of projects and constructing decision rules for identifying successful project outcomes. The study focuses on reward-based crowdfunding on art, comics, dance, film & video, music and theater categories. The dataset used in the analysis contains 8996 projects and 19 attributes. Data management and analysis were performed using Jamovi and WEKA. We used feature selection to determine important attributes. In line with the results derived from feature selection; videos, updates, comments, rewards, goals, number of images, number of word attributes has been included in the analysis. Applying decision trees, the results of the analyses comply with previous studies' findings on the positive effect of some attributes –having at least one video, number of comments and updates. Our model works with 74.5554% accuracy. In comparison to the previous studies, experimental results show satisfactory accuracy and correct classification rates.

Keywords Decision trees · Knowledge discovery · Classification · Reward based · Crowdfunding

C. Gürler (✉)
Faculty of Economics and Administrative Sciences, Yalova University, Yalova, Turkey
e-mail: cem.gurler@yalova.edu.tr

M. Çağlar
Faculty of Economics and Administrative Sciences, Yildiz Technical University, Istanbul, Turkey
e-mail: m.caglar@yildiz.edu.tr

R. Lenart-Gansiniec, J. Chen (eds.), *Crowdfunding in the Public Sector*,
Contributions to Finance and Accounting,
https://doi.org/10.1007/978-3-030-77841-5_10

10.1 Introduction

Crowdfunding is one of the most important innovations in fundraising brought by Internet technologies. Entrepreneurs, who need financial support, find the opportunity to realize their projects by raising funds through crowdfunding platforms. Crowdfunding platforms are open to all entrepreneurs in many different fields and industries. This fundraising method has also affected the way artists raise funds for their art and culture projects. Artists who prepare projects in the field of art and culture such as music, film, video, publishing, comics and theater also try to benefit from the crowdfunding opportunity. While crowdfunding is an important and beneficial fundraising alternative, ensuring the success of projects to be presented on crowdfunding platforms is a challenging process. In this sense, this study aims to guide entrepreneurs and artists on how to make their crowdfunding projects successful. In accordance with this purpose, the success factors of art projects are tried to be determined and a model is presented to predict projects' success. This study focuses on reward-based crowdfunding projects presented on Kickstarter, which is one of the most prominent crowdfunding platforms. A significant majority of crowdfunding projects in the art and cultural industries are reward-based type (De Voldere and Zeqo 2017; Rykkja et al. 2020). Since most of the entrepreneurs in the art and culture industry chose reward-based crowdfunding, we focused on these types of projects. 8996 projects presented in art, comics, dance, film and video, music and theater categories are included in the analysis. Total of 15 attributes of these projects are examined. Applying t-test we investigated whether there is a difference in the fundraising status (whether successful or failed) in terms of the attributes or not. After, introducing a decision tree model that classifies the submitted projects at Kickstarter as successful or failed, we aimed to build guiding rules to underline the key success features for entrepreneurs who were to make an online call for fundraising.

The structure of the paper is as follows. Firstly, crowdfunding in art and culture industries is presented in detail. Secondly, a literature review on success determinants of crowdfunding projects in general and projects in art and culture are summarized. In the methodology section we explained the data and attributes used, and a decision tree method. Finally, results of the analysis are presented and discussed.

10.2 Crowdfunding in Art and Culture

Entrepreneurs or project owners who have an idea but lack of funding, have a new opportunity, an alternative financial source: crowdfunding (Belleflamme et al. 2013). Project owners use crowdfunding because it provides them with a direct access to the market and with an opportunity to financing their projects through interested supporters (Ordanini et al. 2011). The term brings venture capitalists or angel investors

into mind, yet they all refer to different scopes of funding. Angel investors usually put a project into practice with capital and provide consultancy, whereas a venture capitalist provides financial support for projects that have reached a notable stage. On the other hand, the crowd composes of large and anonymous investors and the investments are carried out via the Internet with small amounts (Moritz et al. 2014; Gerber et al. 2012). Michael Sullivan was the first to use the term crowdfunding in his fundavlog in 2006 (Burkett (2011). Having the same base word with crowdfunding, in crowdsourcing a firm or an organization outsources a task to the crowd (Kleemann et al. 2008). The main reason behind the usage of crowd stems from its cost advantage. A similar example can be provided by Wikipedia, where people do not only create contents but also add information to the contents (Trainor 2009).

In crowdfunding, project owners benefit from the crowd as in the case of crowdsourcing. Belleflamme et al. (2010) revised the definition of crowdsourcing (Kleemann et al. 2008) to define crowdfunding as follows: "*Crowdfunding involves an open call, essentially through the Internet, for the provision of financial resources either in form of donation or in exchange for some form of reward and/or voting rights.*" Crowdfunding involves four different sub-models: equity-based, in which funders get financial benefits (e.g. stocks, dividends) in exchange for the contributions they make (Belleflamme et al. 2013); and debt-based, in which project owners receive money from backers and pay their debts and/or interest at maturity (Voorbraak 2011), fall under the financial crowdfunding category. Non-financial crowdfunding category on the other hand includes donation-based and reward-based models. In the donation-based model, funders back the projects without expecting any returns (Belleflamme et al. 2013); whereas in reward-based model, funders receive a reward for backing a project (Mollick 2014). Besides, Cumming et al. (2015) classify crowdfunding platforms as "all or nothing" and "keep it all". In all or nothing models, if a project fails the pledged amount returns to backers, whereas in keep it all models, the pledged amount could be transferred to the project owner even though the project fails.

The first usage of the Internet by artists for fundraising was in 1997. A British rock group Marillion raised $60,000 from their fans via the Internet to organize a United States tour (Davies 2015). Founded in 2001 and launched in 2003, ArtistShare, the platform where musicians and fans come together, can be considered as the first crowdfunding website (Wharton 2010). The first project created on ArtistShare was Maria Schneider's jazz album. She offered 3 different rewards to the backers and her project raised about $130,000. Thanks to the backers who supported the project, she released her album and won her Grammy (Freedman and Nutting 2015). The chance of project's success in art categories, highly depends on fans. Moreover, fan's age group and genre have an importance on project's success (Gamble et al. 2017). Davidson and Poor (2015) pointed out that, an artist who provides most of the pledged amount from old fans will not intend to use crowdfunding again. They also stated that crowdfunding could not replace traditional financing methods especially for some art projects.

Art and cultural activities have been facing some financial problems such as budget cuts by governments and foundations in many countries especially in the United States of America, Canada, Australia and Europa after the 2008 Global Financial Crisis (Boeuf et al. 2014; McDonnell and Tepper 2014; Belfiore 2015; Oakes and Oakes 2015; Daniel 2019). On the other hand, crowdfunding is considered to have substantial potential for art and culture industries by fostering innovation and generating wealth (Brabham 2017; Gernego et al. 2020). Traditional fundraising methods for art and culture projects include patronage, non-profit grants, government-sponsored grants, and corporate sponsorship (Brabham 2017). These traditional methods may be inefficient for artists since they are characterized by bureaucratic structure and involve strict requirements (Preece 2015). Besides, traditional methods may be time consuming for artists who need an argent fund (Lin and Phillips 2017). The other important downside of these traditional fundraising methods is elitism (Brabham 2017). Cultural elitism is a major obstacle for low- and middle-class artists in raising funds for their projects. Unlike other fundraising methods, crowdfunding is a more democratic method (Mollick and Nanda 2016; Brabham 2017). That makes crowdfunding open to every artist. Crowdfunding platforms are not just a funding platform for art and cultural industries. Crowdfunding is much more than a fund-raising method. Besides financing a project, crowdfunding is used as a tool for audience development, community building, internal strategy and skills development, communication and marketing, and market research (De Voldere and Zeqo 2017). Using crowdfunding platforms, project owners can lunch a better product by aggregating feedbacks and building brand awareness (Cha 2017). Because of these downsides of the traditional fundraising methods and benefits of crowdfunding, many artists are increasingly turning to crowdfunding to raise fun for their arts and culture projects (Boeuf et al. 2014).

10.3 Success Factors in Crowdfunding Projects

Predicting the success of crowdfunding projects and the determinants of these projects' success have stimulated researchers' curiosity and attention. Mollick (2014) examined 48,526 Kickstarter projects using logistic regression in order to provide insights into the success and failure dynamics of crowdfunding projects. According to the results of this study, while elements of project quality such as the size of the social network, quality of videos and frequency of updates are found to be increasing the chances of project success, spelling errors are found to be reducing it. In parallel with Mollick's (2014) findings, some researchers also suggested that targeted fund or funding goal (Crosetto and Regner 2014; Koch and Siering 2015; Marelli and Ordanini 2016; Cordova et al. 2015; Štofa and Zoričak 2016; Bao and Huang 2017; Buttice et al. 2017; Courtney et al. 2017; Skirnevskiy et al. 2017; Clauss et al. 2018; Wang et al. 2018; Zhou et al. 2018; Cornelius and Gokpinar 2019) and the duration of a project (Mitra and Gilbert 2014; Cordova et al. 2015; Buttice et al. 2017; Courtney et al. 2017; Skirnevskiy et al. 2017; Wang et al. 2018;

Zhou et al. 2018; Cornelius and Gokpinar 2019) are negatively associated with success.

Apart from the attributes mentioned so far, attributes such as project description and content, presence of a variety of visuals and their effects on the outcome of crowdfunding projects have been questioned as well. Koch and Siering (2015) found that while depth of project description, the number of images, the presence of a video, the number of projects previously backed, and the availability of project updates had a positive correlation with success; the number of projects that founders have previously created, the duration of the project and the number of Facebook friends do not have any significant impact on the project success. Crosetto and Regner (2014) investigated the success determinants of crowdfunding projects by analyzing 2252 projects at the Startnext platform. They suggested that the targeted amount and funding duration lower the chance of a project to be successful. However, the number of words used to describe a project, number of images, number of videos and number of blog entries have a positive impact on the project's success. As some other researchers (Greenberg et al. 2013; Mitra and Gilbert 2014; Chan et al. 2018; Kuppuswamy and Bayus 2018; Zhou et al. 2018; Cornelius and Gokpinar 2019) also mentioned in their studies, the authors stated that crowdfunding projects' category affected the success of projects. Marelli and Ordanini (2016) found that project owners' background and presence of previous projects, either successful or failed were not significant determinants of success. However, the number of projects that the owner has backed on the platform has a positive correlation with project's success as well as the presence of videos and special offers for early backers. Media usage such as video (Courtney et al. 2017; Buttice et al. 2017; Zhou et al. 2018; Cornelius and Gokpinar 2019) and images (Courtney et al. 2017; Buttice et al. 2017; Zhou et al. 2018; Yeh et al. 2019) are thought to increase the success chance of a project.

Most of the project creators share their personal social media accounts and their project's social media accounts on the crowdfunding platforms. By doing so, they provide more information about themselves and their projects. According to Kaur and Gera (2017), social media interactions and connectivity play an important role for projects to be successful. Some researchers revealed that having social media accounts (Clauss et al. 2019), providing additional links and websites (Courtney et al. 2017; Skirnevskiy et al. 2017), the number of Facebook friends (Buttice et al. 2017; Zhou et al. 2018; Yeh et al. 2019) and the number of Facebook shares (Courtney et al. 2017) increase the chance of a project to be successful. However, Koch and Siering (2015) suggest that the number of Facebook friends is not a significant determinant of a project's success. Furthermore, some researchers (Xu et al. 2014; Xiao et al. 2014; Joenssen et al. 2014) emphasized communication as a key success factor for crowdfunding projects. According to Wang et al. (2018) besides communication, interaction between backers and project creators are also important for a project to be successful. They pointed out that the number of comments during the fundraising, comment sentiment and comment length have a positive effect on success. They add that the number of replies by project creators to the comments, reply speed and reply length increase the probability of project

success. Also, some researchers have found that the number of comments (Courtney et al. 2017; Wang et al. 2018; Cornelius and Gokpinar 2019) and updates (Kuppuswamy and Bayus 2018; Yeh et al. 2019) are positively associated with the success of a project.

In the literature there is a limited number of studies that try to determine success determinants of art and cultural projects. Boeuf et al. (2014) examined 875 successful theatre projects on Kickstarter in 2011 in the USA. They found that the amount raised was positively correlated with project owner's previous financial support as a crowdfunder and negatively correlated with project owner's having previously funded project. Type of a theatre (comedy, musical, drama) and location in a city are determinants of a project's success. They found that the duration of a project showed a quadratic relationship with the amount raises. The amount raised increases in the first 68 days and then starts to decrease after that period. Štofa and Zoričak (2016) tried to find the common attributes of successful art and culture projects. In their study the researchers used category, goal, start date and duration of the projects to predict the success of the projects. They found that the projects' success differs by category. Their study shows that while the duration of a project does not affect a project's success, the goal is negatively correlated with success of a project. Bi et al. (2017) examined 999 projects in Science & Technology, Entertainment, Agriculture, and Art categories on a Chinese crowdfunding platform. Their results show that number of likes, reviews, videos, word count and duration of a project positively affect projects' success. However, they found that goal of a project was not correlated with projects' success. Bao and Huang (2017) examined 559 film & video and publishing projects on Kickstarter. They found that goal and duration of project decreased the success of the projects. Offering reward(s), number of updates, comments, Facebook friends and previously backed projects increasing successes of film & video and publishing projects. While a number of visual contents (pictures and videos) increases the success of film & video projects, it does not affect the success of publishing projects. Cha (2017) examined 447 video game projects on Kickstarter. He found that while team submission and prior experience of project owner(s) were positively correlated with the success of a project, providing project owner(s) education information decreases the change of success. His study shows that a number of videos, images and animated graphics increase the chance of a project's success. However, number of social networking sites and number of audio recordings are not correlated with a project's success. Unlike other researchers, Lin and Phillips (2017) used a qualitative approach by doing interviews. They concluded that quality, uniqueness and preparedness of projects, the appropriate marketing strategy, a realistic and honest funding target and attractive rewards contributes success of art and cultural crowdfunding projects.

Greenberg et al. (2013) tried to find the best tool to predict whether a crowdfunding project will be successfully funded prior to its launch. Their dataset consisted of more than 13,000 Kickstarter projects. They performed various decision tree algorithms (J48 Trees, Logistic Model Trees, Random Forests, Random Trees and REPTree) and support vector machines (SVM) with different kernel functions. The authors concluded that decision trees provided the best results with nearly a 67%

accuracy rate. Etter et al. (2013) tried to find the best tool to predict a project's success by taking Greenberg et al.'s (2013) accuracy of 67% as a baseline. They performed k-nearest neighbors (kNN) classifier, markov chain and SVM. kNN classifier and markov chains provided similar results with the prediction accuracy of 85% for projects that have terminated 15% of their whole duration. Kaur and Gera (2017) used logistic regression the predict the success and their model works with 76.7% accuracy. Ahmad et al. (2017) performed Random Forests and reported 94.29% accuracy. Another work used Random Forests with Adabost and subsampling had 57.79% accuracy. Ryoba et al. (2020) run whale optimization algorithm with the KNN and get a 64% of accuracy. Then, they used feature selection and run the algorithm again. At the end, the accuracy of the algorithm increases to 88%.

10.4 Research Methodology

In this study we examined total of 8996 reward-based projects in art and culture presented on Kickstarter. As a data analysis method, we used a decision tree algorithm called the J48 classifier to identify success rules and predict success status of crowdfunding projects. The goal of this research is to guide artists, who will present their projects to crowdfunding platforms, by identifying the success determinants of crowdfunding projects. The study handles the problem as a binary classification of projects as successful and failed. The aim of a classification task is to predict the class of given samples by using the values samples have with respect to each available attribute as inputs (Kantardzic 2011). A number of studies in the crowdfunding literature proposed decision trees for success prediction and stated that they can yield higher accuracy rates compared to other data mining methods (Greenberg et al. 2013; Rao et al. 2014). Following the findings of the literature, this study implements decision trees as the data analysis technique for our binary classification problem. Data management and analysis were performed using Jamovi (2020) and Frank et al. (2016).

10.4.1 Dataset

We focused on reward-based crowdfunding projects presented on Kickstarter. There were total of 19 attributes and 9059 projects on art, comics, dance, film & video, music and theater categories in the dataset. However, the attributes of the number of projects backed by creator and Facebook shares were excluded from analysis because of missing values. Moreover, 63 projects were also excluded from the analysis for the same reason. Location attribute was also removed from the data as it only consists of city names. In the end, 15 attributes and 8996 projects were included in the analysis. Among these 15 attributes on of them was about project's

Table 10.1 Attributes of crowdfunding projects and their explanations

Attribute of the projects	Descriptions of the attributes
Project status (dependent)	Whether the project reached its goal or not (successful = 1, failed = 0)
Goal	The amount of fund the project owner wanted to collect
Duration in days	The project's duration in days
Video presence	Whether the project has a video or not
Number of videos	The number of videos shared in the project
Number of images	The number of images shared in the project
Number of rewards	The number of rewards set by project owner
Number of updates	The number of updates the project owner has done within the project duration
Number of comments	The number of comments made regarding the project
Number of words (description)	The number of words used to describe the project
Number of words (risks and challenges)	The number of words to describe potential risks and challenges of the project
Number of FAQs	The number of frequently asked questions (FAQs)
Facebook connected	Whether the project owner connects his Facebook profile to his profile or not
Creator—number of projects created	The number of projects created by project owner

status. Project status shows whether a project reached its determined funding goal. The projects which reached their funding goals were indicated as successful, and the projects which could not reach their funding goals were indicated as failed. The related attributes and their descriptions are given in Table 10.1.

10.4.2 Decision Tree

Decision tree models are a very popular and powerful techniques because of their simplicity (Rao et al. 2014) and the fact that these techniques do not require assumptions about the distributions of the data (Friedl and Brodley 1997). Decision trees have a tree structure and a hierarchy like a flow chart. A classical tree structure has three components: 1—internal node (nonleaf node), which denotes a test on an attribute value 2—branch, which represent an outcome of the test and 3—leaf node (terminal node), which holds a class label. Figure 10.1 illustrates an example of a tree structure.

A decision tree is created by the process of splitting the values of attributes. In the splitting process the value of an attribute is tested and then a branch for each of its possible values is created. This process carries on until each branch is labelled by only one class (Bramer 2007). In decision trees, the information gain is calculated for each attribute and splitting is implemented on the attribute which gains the most information or in other words effects the target attribute the most

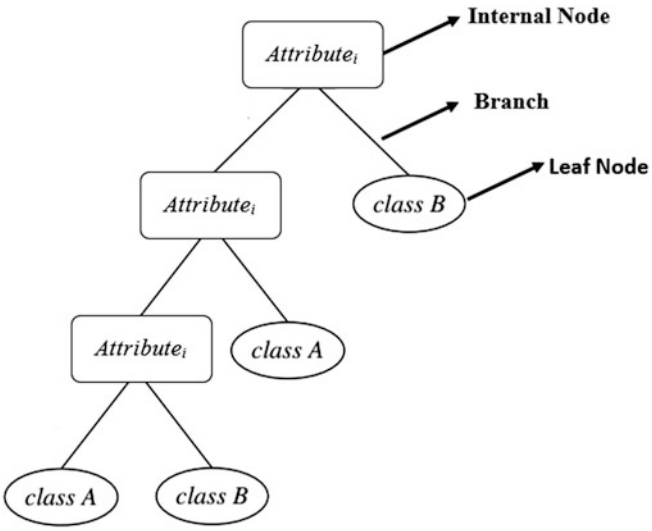

Fig. 10.1 Decision tree structure. Source Han, J., Pei, J., & Kamber, M. (2011). Data mining: concepts and techniques. Elsevier

(Witten et al. 2017). The information gain of an attribute α for a set of cases T is calculated as follows (Ruggieri 2002):

If α is a discrete and $T_1, \ldots, T_s$ are the subsets of T consisting of cases with distinct known value for attribute α, then:

$$gain = info(T) - \sum_{i=1}^{s} \frac{|T_i|}{|T|} \times info(T_i) \quad (10.1)$$

where

$$info(T) = -\sum_{j=1}^{NClass} \frac{freq(C_j, T)}{|T|} \times \log_2 \left(\frac{freq(C_j, T)}{|T|} \right) \quad (10.2)$$

is the entropy function.

We use J48 classifier as the decision tree algorithm. J48 classifier is a simple Java implementation of the C4.5 decision tree algorithm in WEKA open-source software (Sharma and Sahni 2011; Patil and Sherekar 2013). Developed by Ross Quinlan (1993), C4.5 produces small and accurate trees and thus considered as a fast and reliable classifier (Salzberg 1994). C4.5 algorithm considers the information gain ratio of the splitting $T_1, \ldots, T_s$ which is the ratio of information gain to its split information:

$$Split\ (T) = -\sum_{i=1}^{s} \frac{|T_i|}{|T|} \times \log_2\left(P\frac{|T_i|}{|T|}\right) \tag{10.3}$$

10.5 Results

Before analyzing the data, we used feature selection in WEKA to determine important attributes and to increase accuracy of classification. Large number of attributes can cause overfitting in a learning model. To avoid overfitting, feature selection methods are widely used (Pandya and Pandya 2015). The purposes of using feature selection in classification algorithms are as follows (Liu and Motoda 1998):

1. Classification algorithms can learn faster with less data.
2. Increase in accuracy
3. The results may be easier to understand
4. If there is a need to collect data again, things get easier because of fewer features.

We used WrapperSubsetEval algorithm on Weka to reduce the number of independent attributes. The selection results are presented in Table 10.2.

There were total of 14 independent variables in the dataset. After applying feature selection, the number of independent attributes decreased to 7. Thus these 7 attributes were used in the analysis stage.

Several studies reported that sharing a video in a project page increased its chance of success (Koch and Siering 2015; Marelli and Ordanini 2016; Bao and Huang 2017). We run a chi-square test to investigate the relationship between video presence and project's success. The results of chi-square test show a significant association for the attributes (chi square = 158.392, $p < 0.001$). One can also infer

Table 10.2 Feature selection results

All Attributes in the dataset	Selected Attributes
Facebook Connected, Video presence, Number of Updates, Number of Comments, Number of Rewards, Goal, Duration in Days, Creator—Number of Projects Created, Number of Videos, Number of Images, Number of Words (Description), Number of Words (Risks and Challenges), Number of FAQs	Video presence, Number of Updates, Number of Comments, Number of Rewards, Goal, Number of Images, Number of Words (Risks and Challenges)

Table 10.3 The relationship between video presence and project's success

	Has video	
State	No	Yes
Failed	723 (19.1%)	3066 (80.9%)
Successful	512 ((9.8%)	4695 (90.2%)

Table 10.4 T-test results

	State	Mean	Median	Std. Dev.	p
Updates	Failed	1.327	0	2.931	<0.001
	Successful	3.920	2	5.116	
Goal	Failed	65863.119	6000	249298.543	0.030
	Failed	7675.012	3500	25167.197	
Comments	Successful	0.703	0	2.811	<0.001
	Failed	7.312	1	100.108	
Rewards	Failed	9.195	8	5.596	<0.001
	Successful	11.101	10	6.654	
Number of images	Failed	3.478	0	6.865	<0.001
	Failed	4.655	2	7.590	
Number of words (risk and challenges)	Successful	125.184	98	101.184	0.443
	Failed	123.639	102	83.176	

from the Table 10.3 that if a project has a video, the project has a higher chance of success.

We used t-test to investigate whether there is a difference in each of the remaining 6 independent attributes in terms of project success or not. Table 10.4 provides the t-test results and summary statistics for the attributes, except project status and video presence.

According to the results presented in Table 10.4, the number of updates, comments, rewards, images and goal differ by project's success status. One can infer from the results that setting higher goals makes it difficult for the project to be successful. In addition, updating the project, getting more comments, giving more rewards and uploading more images increase the chance of project's success.

In a decision tree algorithm we used a project status as an outcome. Project status shows whether a project reached its funding goal or not. The projects which reached their funding goals are coded as 1 indicating "successful" and the project which could not reached funding goals are coded as 0 indicating "failed". The other 7 attributes are predicters (independent variables). The predictors include "Video presence", "Number of Updates", "Number of Comments", "Number of Rewards", "Goal", "Number of Images", "Number of Words (Risks and Challenges)". The decision structure attained after applying J48 algorithm as a decision tree technique is shown in Fig. 10.2.

Decision trees provide us with some rules in order to reach a successful outcome for projects (The complete list of decision rules is given in Appendix). An example is given as follows:

- IF a number of updates is greater THAN 1 (updates $>$ 1) AND a goal is less THAN or equal to 12,700 (goal $\leq$ 12,700) THEN a project is SUCCESSFUL.
- IF a number of updates is greater THAN 1 (updates $>$ 1) AND a goal is greater THAN 12700 (goal $>$ 12,700) AND a number of comments is greater THAN 2 (comments $>$ 2) THEN a project is SUCCESSFUL.

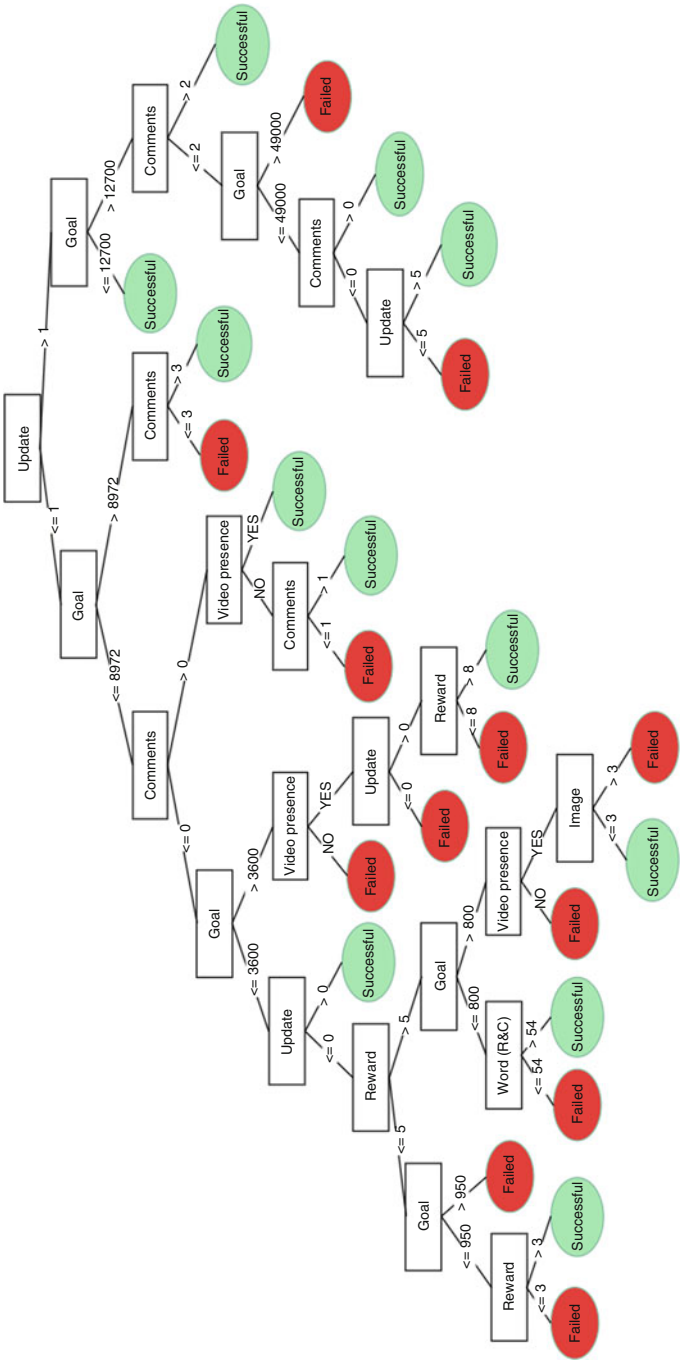

Fig. 10.2 Visualization of J48 results

Table 10.5 Performance of J48 Algorithm

Correct classification rate	TP rate	FP rate	Precision	Recall	F-measure	ROC area
74.5554%	0.858	0.409	0.743	0.858	0.796	0.786

- IF a number of updates is greater THAN 1 (updates $>$ 1) AND a goal is greater THAN 12700 (goal $>$ 12,700) AND a number of comments is less THAN or equal to 2 (comments $\leq$ 2) AND a goal is greater THAN 49000 (goal $>$ 49,000) THEN a project is FAILED.
- IF a number of updates is greater THAN 1 (updates $>$ 1) AND a goal is greater THAN 12700 (goal $>$ 12,700) AND a number of comments is less THAN or equal to 2 (comments $\leq$ 2) AND a goal is less THAN or equal to 49,000 (goal $\leq$ 49,000) AND a number of comments is greater THAN 0 (comments $>$ 0) THEN a project is SUCCESSFUL.
- IF a number of updates is greater THAN 1 (updates $>$ 1) AND a goal is greater THAN 12700 (goal $>$ 12,700) AND a number of comments is less THAN or equal to 2 (comments $\leq$ 2) AND a goal is less THAN or equal to 49,000 (goal $\leq$ 49,000) AND a number of comments is equal to 0 (comments $\leq$ 0) AND a number of updates is greater THAN 5 (updates $>$ 5) THEN a project is SUCCESSFUL.
- IF a number of updates is greater THAN 1 (updates $>$ 1) AND a goal is greater THAN 12700 (goal $>$ 12,700) AND a number of comments is less THAN or equal to 2 (comments $\leq$ 2) AND a goal is less THAN or equal to 49,000 (goal $\leq$ 49,000) AND a number of comments is equal to 0 (comments $\leq$ 0) AND a number of updates is less THAN or equal to 5 (updates $\leq$ 5) THEN project is FAILED.

When we examine the tree structure and the rules (Fig. 10.2), we can say that receiving a greater number of comments have a positive effect on a project's success. Receiving more comments seems to be an indicator for a potential funder that the project is attracting others' interest too and thus can be successful in collecting the required amount. The number of updates also increases the chance of success. When project owners update their project more often, this has a positive effect on the potential funders who are encouraged to offer monetary support. Also, more rewards offered, and words written about the risk and challenges involved increase the chance of success. Diversifying the rewards and adding an explanatory video have both a positive impact on reaching the goal, too. According to the statistical results (Table 10.4), a number of words (risk and challenges) has no effect on the project success status. Interestingly, we can infer from the J48 results that explaining risk and challenges of the project with more THAN 54 words increases the project's success.

We use the decision tree (J48 classifier) in WEKA with a tenfold cross validation. Table 10.5 shows relevant statistics regarding the accuracy and predictive performances.

Table 10.6 Classification performance by category

			Predicted		
			Successful	Failed	Correct classification rate
Actual	**Art**	Successful	622	94	73.58%
		Failed	264	375	
	Comics	Successful	340	2	76.45%
		Failed	132	95	
	Dance	Successful	151	36	74.52%
		Failed	31	45	
	Film & Video	Successful	1566	255	75.51%
		Failed	591	1042	
	Music	Successful	1506	199	77.20%
		Failed	419	586	
	Theatre	Successful	364	72	77.21%
		Failed	75	134	

The true positive (tp) rate shows the proportion of actually successful samples which are correctly classified as successful, while the false positive (fp) rate shows the proportion of actually failed samples that are incorrectly classified as successful (Sharma and Jain 2013). Classification rate ranges from 0 to 1, where 1 means there were no false positives (i.e. no successful classified as failed) (van Kesteren et al. 2009). F-Measure is calculated using precision and recall and it ranges from 0 to 1—higher value shows better prediction performance. To qualify a model as good, both the precision and recall values should be high (Koru and Liu 2005). Additionally, the areas under the ROC (AUROC) curves are emphasized as the power of the classifier. Table 10.5 shows that our model performs well.

In the dataset there were total of 6 categories related to art and culture projects. These categories include art, comics, dance, film & video, music and theatre. These categories are described by Kickstarter. In order to identify the generalization of the model, we calculated correct classification rates for each of these categories. Classification results and correct classification rates for each category are shown in Table 10.6.

Correct classification rates by category vary between 73.58% and 77.21%. While the category with the lowest correct classification rate is Art, the category with the highest correct classification rate is Theatre. Using the mentioned attributes and the decision tree model gives very accurate results in success prediction of crowdfunding projects.

10.6 Discussion

This study tries to identify the success determinants of crowdfunding projects and correctly predict whether projects will be successful, or they will fail. This way, the entrepreneurs who will present their projects to crowdfunding platforms will be

guided. We focus on reward-based crowdfunding projects on art, comics, dance, film & video, music and theater categories. The dataset contains 8996 finished crowdfunding projects submitted to Kickstarter and 20 attributes of these projects. We used the WrapperSubsetEval algorithm as a feature selection method on WEKA to determine the important attributes. By doing this, we aimed to improve the accuracy of the results. Some researchers pointed out to the duration of a project (Mitra and Gilbert 2014; Cordova et al. 2015; Buttice et al. 2017; Courtney et al. 2017; Skirnevskiy et al. 2017; Wang et al. 2018; Zhou et al. 2018; Cornelius and Gokpinar 2019), a number of words used to describe the project (Koch and Siering 2015; Bi et al. 2017), a number of videos (Crosetto and Regner 2014; Bi et al. 2017; Cha 2017) attributes have an impact on project's success. On the other hand, some researchers reported that the number of projects created by project owner (Koch and Siering 2015; Marelli and Ordanini 2016) and the duration of the project (Boeuf et al. 2014; Koch and Siering 2015; Štofa and Zoričak 2016) did not have any impact on the project success. According to the feature selection results, the attributes used in the analysis are as follows: has video, updates, comments, rewards, goal, number of images, number of words (risks and challenges).

First, we investigated whether there is a relationship between having a video and project's success or not. The chi-square results show that video presence increases the project's success. Secondly, we run t-tests to compare the attributes in terms of project's success. According to the results, successful and failed projects have statistically different number of updates, comments, rewards, images and goals. However, there was no difference in the number of words used to describe risk and challenges between successful and failed projects. T-test results revealed that successful projects aimed to collect less money, get more comments, update more, offer more rewards and share more images than failed projects. It is a clear evidence that setting a high goal decreases the success chance of a project. Also, a similar situation applies to comments. Getting more comments increases the project's success as more comments attract people's attention and raise the project's awareness. Besides, uploading videos, images, making updates, explaining a project's risk and challenges as broadly and offering as much rewards as possible increase the success chance of a project. Finally, we run J48 algorithm to investigate factors affecting a project's success. Generated tree supports t-test results. Update was the root node, so this shows the importance of the attribute. Updating the projects increase the chance of the project's success. Some researchers also stated that updating the project was positively associated with the project's success (Koch and Siering 2015; Kuppuswamy and Bayus 2018; Yeh et al. 2019). A number of studies found a negative correlation between the goal and project's success (Crosetto and Regner 2014; Koch and Siering 2015; Marelli and Ordanini 2016; Cordova et al. 2015; Štofa and Zoričak 2016; Bao and Huang 2017; Buttice et al. 2017; Courtney et al. 2017; Skirnevskiy et al. 2017; Clauss et al. 2018; Wang et al. 2018; Zhou et al. 2018; Cornelius and Gokpinar 2019). We also found that setting a higher goal decreased the chance of project success. Project owners should set a fair goal to make their dreams happen. Another important attribute from J48 results was comment as so t-test. Comment was the only attribute in our dataset that cannot be

influenced by a project owner. In accordance with the literature (Courtney et al. 2017; Wang et al. 2018), we also found that getting more comments had a great contribution to the project's success. Several studies revealed that the visual quality of a project affected its chance of success (Crosetto and Regner 2014; Koch and Siering 2015; Marelli and Ordanini 2016; Bao and Huang 2017; Cha 2017). We also pointed out that with the chi square test, t-test and J48 algorithm. As stated in, having a video in a project and uploading images with an average of 4.655 increased the project's success. Moreover, diversification of rewards or offering more rewards, explaining project's risk and challenges with more words positively affect the project's success as well.

10.7 Conclusion

This study handles the success prediction for the crowdfunding art and culture project problem as a binary classification of projects as successful and failed. Using feature selection, video presence, number of updates, number of comments, number of rewards, goal, number of images, number of words (risks and challenges) from 15 attributes are selected as explanatory attributes for the success/fail outcome. Using a decision tree, the experimental results show good performance of classification for reward-based crowdfunding projects. The attributes that are selected in this study are powerful in explaining the success outcome of projects, yet different attributes can be added in any future research. Since the paper exploits the importance of comments and updates, we also consider using text mining for future research and investigate the problem deeply from the contextual perspective.

Appendix: The Complete List of Decision Rules

```
Updates <= 1
|  Goal <= 8972
|  |  Comments <= 0
|  |  |  Goal <= 3600
|  |  |  |  Updates <= 0
|  |  |  |  |  Rewards <= 5
|  |  |  |  |  |  Goal <= 950
|  |  |  |  |  |  |  Rewards <= 3: failed (89.0/39.0)
|  |  |  |  |  |  |  Rewards > 3: successful (130.0/53.0)
|  |  |  |  |  |  Goal > 950: failed (311.0/73.0)
|  |  |  |  |  Rewards > 5
|  |  |  |  |  |  Goal <= 800
|  |  |  |  |  |  |  # Words (Risks and Challenges) <= 54: failed (54.0/25.0)
|  |  |  |  |  |  |  # Words (Risks and Challenges) > 54: successful (189.0/55.0)
|  |  |  |  |  |  Goal > 800
|  |  |  |  |  |  |  Has Video = No: failed (137.0/50.0)
|  |  |  |  |  |  |  Has Video = Yes
|  |  |  |  |  |  |  |  # Images <= 3: successful (470.0/215.0)
|  |  |  |  |  |  |  |  # Images > 3: failed (118.0/50.0)
|  |  |  |  Updates > 0: successful (449.0/150.0)
|  |  |  Goal > 3600
|  |  |  |  Has Video = No: failed (110.0/13.0)
|  |  |  |  Has Video = Yes
|  |  |  |  |  Updates <= 0: failed (522.0/154.0)
|  |  |  |  |  Updates > 0
|  |  |  |  |  |  Rewards <= 8: failed (73.0/26.0)
|  |  |  |  |  |  Rewards > 8: successful (99.0/39.0)
|  |  Comments > 0
|  |  |  Has Video = No
|  |  |  |  Comments <= 1: failed (89.0/39.0)
|  |  |  |  Comments > 1: successful (69.0/22.0)
|  |  |  Has Video = Yes: successful (759.0/202.0)
|  Goal > 8972
|  |  Comments <= 3: failed (1178.0/127.0)
|  |  Comments > 3: successful (87.0/34.0)
Updates > 1
|  Goal <= 12700: successful (3118.0/568.0)
|  Goal > 12700
|  |  Comments <= 2
|  |  |  Goal <= 49000
|  |  |  |  Comments <= 0
|  |  |  |  |  Updates <= 5: failed (139.0/41.0)
|  |  |  |  |  Updates > 5: successful (83.0/38.0)
|  |  |  |  Comments > 0: successful (136.0/45.0)
|  |  |  Goal > 49000: failed (115.0/21.0)
|  |  Comments > 2: successful (472.0/91.0)
```

References

Ahmad FS, Tyagi D, Kaur S (2017, December) Predicting crowdfunding success with optimally weighted random forests. In: 2017 International Conference on Infocom Technologies and Unmanned Systems (Trends and Future Directions) (ICTUS). IEEE, pp 770–775

Bao Z, Huang T (2017) External supports in reward-based crowdfunding campaigns. Online Inf Rev 41(5):626–642

Bramer M (2007) Principles of data mining, vol 180. Springer, London

Belfiore E (2015) 'Impact', 'value' and 'bad economics': making sense of the problem of value in the arts and humanities. Arts Humanities High Educ 14(1):95–110

Belleflamme P, Lambert T, Schwienbacher A (2010, June) Crowdfunding: an industrial organization perspective. In: Prepared for the workshop digital business models: understanding strategies, held in Paris in June, pp 25–26

Belleflamme P, Lambert T, Schwienbacher A (2013) Individual crowdfunding practices. Ventur Cap 15(4):313–333

Bi S, Liu Z, Usman K (2017) The influence of online information on investing decisions of reward-based crowdfunding. J Bus Res 71:10–18

Boeuf B, Darveau J, Legoux R (2014) Financing creativity: crowdfunding as a new approach for theatre projects. Int J Arts Manag 16(3)

Brabham DC (2017) How crowdfunding discourse threatens public arts. New Media Soc 19 (7):983–999

Burkett E (2011) Crowdfunding exemption-online investment crowdfunding and US securities regulation. Tenn J Bus L 13:63

Buttice V, Colombo MG, Wright M (2017) Serial crowdfunding, social capital, and project success. Entrep Theory Pract 41(2):183–207

Cha J (2017) Crowdfunding for video games: factors that influence the success of and capital pledged for campaigns. Int J Media Manag 19(3):240–259

Chan CR, Park HD, Patel P, Gomulya D (2018) Reward based crowdfunding success: decomposition of the project, product category, entrepreneur, and location effects. Ventur Cap 20 (3):285–307

Clauss T, Breitenecker RJ, Kraus S, Brem A, Richter C (2018) Directing the wisdom of the crowd: the importance of social interaction among founders and the crowd during crowdfunding campaigns. Econ Innov New Technol 27(8):709–729

Clauss T, Niemand T, Kraus S, Schnetzer P, Brem A (2019) Increasing crowdfunding success through social media: the importance of reach and utilization in reward-based crowdfunding. Int J Innov Manag 24:2050026

Cordova A, Dolci J, Gianfrate G (2015) The determinants of crowdfunding success: evidence from technology projects. Procedia Soc Behav Sci 181:115–124

Cornelius PB, Gokpinar B (2019) The role of customer investor involvement in crowdfunding success. Manag Sci

Courtney C, Dutta S, Li Y (2017) Resolving information asymmetry: signaling, endorsement, and crowdfunding success. Entrep Theory Pract 41(2):265–290

Crosetto P, Regner T (2014) Crowdfunding: determinants of success and funding dynamics (No. 2014-035). Jena Economic Research Papers

Cumming DJ, Leboeuf G, Schwienbacher A (2015) Crowdfunding models: keep-it-all vs. all-or-nothing, May 31, 2015

Daniel R (2019) Arts and culture in an era of austerity: key stakeholder views on the current and future Australian context. Int J Cult Policy 25(6):780–791

Davidson R, Poor N (2015) The barriers facing artists' use of crowdfunding platforms: personality, emotional labor, and going to the well one too many times. New Media Soc 17(2):289–307

Davies R (2015) Three provocations for civic crowdfunding. Inf Commun Soc 18(3):342–355

De Voldere I, Zeqo K (2017) Crowdfunding: reshaping the crowd's engagement in culture. Publications Office of the European Union. https://op.europa.eu/fr/publication-detail/-/publication/7e10916d-677c-11e7-b2f2-01aa75ed71a1

Etter V, Grossglauser M, Thiran P (2013, October) Launch hard or go home!: predicting the success of Kickstarter campaigns. In: Proceedings of the First ACM Conference on Online Social Networks, pp 177–182
Frank E, Hall MA, Witten IH (2016) The WEKA Workbench. In: Online Appendix for "Data mining: practical machine learning tools and techniques", 4th edn. Morgan Kaufmann, New York
Freedman D, Nutting MR (2015) A brief history of crowdfunding. Including rewards, donation, debt, and equity platforms in the USA
Friedl MA, Brodley CE (1997) Decision tree classification of land cover from remotely sensed data. Remote Sens Environ 61(3):399–409. https://doi.org/10.1016/S0034-4257(97)00049-7
Gamble JR, Brennan M, McAdam R (2017) A rewarding experience? Exploring how crowdfunding is affecting music industry business models. J Bus Res 70:25–36
Gerber EM, Hui JS, Kuo PY (2012, February) Crowdfunding: why people are motivated to post and fund projects on crowdfunding platforms. In: Proceedings of the International Workshop on Design, Influence, and Social Technologies: Techniques, Impacts and Ethics
Gernego I, Petrenko L, Dyba M, Tsarov V (2020). Innovative financing of creative projects on the Kickstarter platform: Ukrainian and Polish experience
Greenberg MD, Pardo B, Hariharan K, Gerber E (2013, April) Crowdfunding support tools: predicting success & failure. In: CHI'13 Extended Abstracts on Human Factors in Computing Systems, pp 1815–1820
Joenssen D, Michaelis A, Müllerleile T (2014, August 6) A link to new product preannouncement: Success factors in crowdfunding. Available at SSRN https://ssrn.com/abstract=2476841
Kantardzic M (2011) Data mining: concepts, models, methods, and algorithms. John Wiley & Sons, New Jersy
Kaur H, Gera J (2017) Effect of social media connectivity on success of crowdfunding campaigns. Procedia Comput Sci 122:767–774
Kleemann F, Voß GG, Rieder K (2008) Un (der) paid innovators: the commercial utilization of consumer work through crowdsourcing. Sci Technol Innov Stud 4(1):5
Koch JA, Siering, M (2015) Crowdfunding success factors: the characteristics of successfully funded projects on crowdfunding platforms. ECIS 2015 Proceedings of the 23rd European Conference on Information Systems (ECIS 2015), Münster, Germany, May 26–29
Koru AG, Liu H (2005) Building effective defect-prediction models in practice. IEEE Softw 22 (6):23–29. https://doi.org/10.1109/MS.2005.149
Kuppuswamy V, Bayus BL (2018) Crowdfunding creative ideas: the dynamics of project backers. In: The economics of crowdfunding. Palgrave Macmillan, Cham, pp 151–182
Lin W, Phillips RA (2017) Success factors and barriers for crowdfunding campaigns for arts-based projects in the UK. IUP J Entrep Dev 14(3):45–65
Liu H, Motoda H (1998) Feature selection for knowledge discovery and data mining, vol 454. Springer, Cham
Marelli A, Ordanini A (2016) What makes crowdfunding projects successful 'before' and 'during' the campaign? In: Crowdfunding in Europe. Springer, Cham, pp 175–192
McDonnell TE, Tepper SJ (2014) Culture in crisis: deploying metaphor in defense of art. Poetics 43:20–42
Mitra T, Gilbert E (2014, February) The language that gets people to give: phrases that predict success on Kickstarter. In: Proceedings of the 17th ACM Conference on Computer Supported Cooperative Work & Social Computing. ACM, New York, pp 49–61
Mollick E (2014) The dynamics of crowdfunding: an exploratory study. J Bus Ventur 29(1):1–16
Mollick E, Nanda R (2016) Wisdom or madness? Comparing crowds with expert evaluation in funding the arts. Manag Sci 62(6):1533–1553
Moritz A, Block JH, Lutz E (2014) Investor communication in crowdfunding: a qualitative-empirical study. Available at SSRN 2462282
Oakes H, Oakes S (2015) An analysis of business phenomena and austerity narratives in the arts sector from a new materialist perspective. Account Bus Res 45(6–7):738–764
Ordanini A, Miceli L, Pizzetti M, Parasuraman A (2011) Crowdfunding: transforming customers into investors through innovative service platforms. J Serv Manag 22(4):443–470

Pandya R, Pandya J (2015) C5.0 algorithm to improved decision tree with feature selection and reduced error pruning. Int J Comput Appl 117(16):18–21

Preece SB (2015) Acquiring start-up funding for new arts organizations. Nonprofit Manag Leadership 25(4):463–474

Patil TR, Sherekar SS (2013) Performance analysis of Naive Bayes and J48 classification algorithm for data classification. Int J Comput Sci Appl 6(2):256–261

Rao H, Xu A, Yang X, Fu WT (2014) Emerging dynamics in crowdfunding campaigns. In: Kennedy WG, Agarwal N, Yang SJ (eds) Social computing, behavioral-cultural modeling and prediction. SBP 2014. Lecture notes in computer science, vol 8393. Springer, Cham, pp 333–340. https://doi.org/10.1007/978-3-319-05579-4_41

Ruggieri S (2002) Efficient C4.5 [classification algorithm]. IEEE Trans Knowl Data Eng 14 (2):438–444. https://doi.org/10.1109/69.991727

Rykkja A, Maehle N, Munim ZH, Shneor R (2020) Crowdfunding in the cultural industries. In: Advances in crowdfunding. Palgrave Macmillan, Cham, pp 423–440

Ryoba MJ, Qu S, Zhou Y (2020) Feature subset selection for predicting the success of crowdfunding project campaigns. Electron Mark 2020:1–14

Salzberg SL (1994) Book review: C4.5: programs for machine learning by J. Ross Quinlan. Morgan Kaufmann Publishers, Inc., 1993. Mach Learn 16(3):235–240. https://doi.org/10.1007/BF00993309

Sharma AK, Sahni S (2011) A comparative study of classification algorithms for spam email data analysis. Int J Comput Sci Eng 3(5):1890–1895

Sharma TC, Jain M (2013) WEKA approach for comparative study of classification algorithm. Int J Adv Res Comput Commun Eng 2(4):1925–1931

Skirnevskiy V, Bendig D, Brettel M (2017) The influence of internal social capital on serial creators' success in crowdfunding. Entrep Theory Pract 41(2):209–236

Štofa T, Zoričak M (2016) Selected success factors of crowdfunding projects. In: European Financial Systems - Proceedings of the 13th International Scientific Conference, pp 752–759

The jamovi project (2020) jamovi (Version 1.2) [Computer Software]. https://www.jamovi.org

Trainor C (2009) Open source, crowd source: harnessing the power of the people behind our libraries. Program 43(3):288–298

van Kesteren M, Langevoort J, Grootjen F (2009, October) A step in the right direction: Botdetection in MMORPGs using movement analysis. In: Proceedings of the 21st Belgian-Dutch Conference on Artificial Intelligence (BNAIC 2009), pp 129–136

Voorbraak KJM (2011) Crowdfunding for financing new ventures: consequences of the financial model on operational decisions. Eindhoven University of Technology, Eindhoven

Wang N, Li Q, Liang H, Ye T, Ge S (2018) Understanding the importance of interaction between creators and backers in crowdfunding success. Electron Commer Res Appl 27:106–117

Wharton (2010) Can you spare a quarter? Crowdfunding sites turn fans into patrons of the arts. http://knowledge.wharton.upenn.edu/article/can-you-spare-a-quarter-crowdfunding-sites-turn-fans-into-patrons-of-the-arts/. Retrieved 12 July 2018

Witten IH, Frank E, Hall MA, Pal CJ (2017) Data Mining: practical machine learning tools and techniques, 4th edn. Morgan Kaufmann, Cambridge

Xiao S, Tan X, Dong M, Qi J (2014) How to design your project in the online crowdfunding market? Evidence from Kickstarter. In: Proceedings of the Thirty Fifth International Conference on Information Systems, Auckland, Australia

Xu A, Yang X, Rao H, Fu WT, Huang SW, Bailey BP (2014, April) Show me the money!: an analysis of project updates during crowdfunding campaigns. In: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems. ACM, pp 591–600

Yeh TL, Chen TY, Lee CC (2019) Investigating the funding success factors affecting reward based crowdfunding projects. Innovation 1–21

Quinlan R (1993) C4.5: Programs for machine learning. Morgan Kaufmann, San Francisco

Zhou MJ, Lu B, Fan WP, Wang GA (2018) Project description and crowdfunding success: an exploratory study. Inf Syst Front 2018:1–16

Chapter 11
A Novel Framework for Energy Audit Based on Crowdsourcing Principles

K. S. Sastry Musti, Gloria N. T. Paulus, and James Katende

Abstract Energy audit is a complex, laborious, and expensive process that needs to be conducted periodically due to various reasons. The data and information gathered during energy audit is of significant value to the very owners and other stakeholders in the energy industry. Specifically, aggregate value of energy saving opportunities can provide excellent insights for developing energy policies. Given the large consumer base and the high value proposition, energy audit is an excellent candidate for considering the application of crowdsourcing. This chapter essentially proposes a novel framework for energy audit based on crowdsourcing principles. Core constituents and system requirements of an energy audit system are outlined, and engineering design approach is suggested for implementing the proposed framework.

Keywords Energy audit · Crowdsourcing · Crowdfunding · Industry 4.0 · Demand side management · Demand response · Energy efficiency · Big data

11.1 Introduction

The energy consumption patterns vary significantly based on consumer type, socio-economic factors, and geographical location. Many societies address the issue of energy consumption be it in commercial, industrial, or residential sector by conducting energy audits. These audits are conducted periodically as the appliances on the load side always change. Carrying out energy audits effectively contributes to the improvement of energy efficiency and reduced energy costs in these sectors. Creating awareness on the importance of energy auditing processes and standardizing them contributes to a much-reduced energy consumption and demand. However, in reality, energy audit exercises are prohibitively exhaustive and consume

K. S. Sastry Musti (✉) · G. N. T. Paulus · J. Katende
Electrical & Computer Engineering, Namibia University of Science and Technology, Windhoek, Namibia
e-mail: kmusti@nust.na; gloria92paulus@gmail.com; jkatende@nust.na

R. Lenart-Gansiniec, J. Chen (eds.), *Crowdfunding in the Public Sector*, Contributions to Finance and Accounting,
https://doi.org/10.1007/978-3-030-77841-5_11

significant time and resources. Also, the overall approach to the energy audit itself varies widely based on the type of consumer. For instance, Energy audits for industrial clients will be totally different from other types of consumers. This chapter proposes for the first time a novel framework for energy audit based on crowdsourcing principles. The proposed framework essentially works on smart platforms that are industry 4.0 ready and thus it is empowered naturally to deal with key aspects such as data collection, information processing, communication, computation, and visualizations. Various requirements and challenges in energy audit processes will be examined through a structured literature review. One of the challenges is the design of user-interfaces for the smart app(s) which is/are the critical components of the suggested framework. For this purpose, this chapter examines various existing energy audit apps and then considers the overall requirements of various technical studies before attempting to illustrate the architecture of the proposed framework. Also, best practices in crowdsourcing approaches will be considered to apply in the design process of the proposed framework. The existing and legacy approaches to energy audit cannot entirely support different technical studies such as demand side management (DSM), demand response programs, energy efficiency and appliance labelling. On the other hand, energy audit requirements and expectations have grown over the time. Now, energy audit programs do consider data over every 30 min interval, and up to a full year to carryout extensive computations. This is due to the fact that energy consumption varies over the day and energy-generating plants are following the loads as well (Conteh et al. 2019). This chapter illustrates how the proposed framework and the very approach can effectively provide support to such studies and different stakeholders. Then the important step is to implement the energy saving measures through assorted programs, which require a significant financial funding to further drive the cause. The chapter makes a case for using crowdfunding approach to resolve this issue since consumer participation is very critical in all energy saving strategies.

The chapter is divided as follows: Section 11.2 provides necessary background information for energy audit processes and related issues. Section 11.3 presents the proposed framework with a diagram for crowdsourcing-based energy audit that has different stages and tasks. Then Sect. 11.4 explains the system requirements and Sect. 11.4.3 provides the need for developing a functional prototype to avoid major faults in implementation. Section 11.5 presents an engineering design approach for implementing the framework. Finally, Sect. 11.6 concludes the chapter.

11.2 Background and Literature Review

Energy audit processes are differently defined, understood and standardized in various countries depending on local requirements and socio-economic conditions. Hence, it is important to understand various load models as they differ from one another depending on the field of study. For instance, load models for demand response are different from the conventional power planning studies such as load

flows. Typically, load flow studies use three different models viz., constant power loads, constant current loads and constant impedance loads. However, demand response considers constant loads, responsive variable loads, non-responsive variable loads and a few more; since objectives are different from planning studies (Sastry Musti 2020b).

11.2.1 Overview of the Energy Audit Process

The overall approach to energy audit itself varies significantly based on the type of consumer. Several studies (Iorgulescu 2017; Boharb et al. 2015; Grebski et al. 2020) have indicated that energy audits for industrial clients will be totally different from other types of consumers and will tend to be complex. Industries typically hire a team of energy audit specialists for this task. The process typically starts with preliminary inspections of the records and walk-throughs to various departments, sections and infrastructural facilities of the client (Boharb et al. 2015). Then a comprehensive plan would be developed for energy audit to study the energy consumption and related issues with HVAC systems, lighting systems, exhaust and cooling systems, functionality of sensors (temperature, light, humidity and pressure etc.) and the end use of their output data, overall efficiency of the heavy equipment, purpose of large machinery and their hours of operation, wellness of ventilation systems, air ducts and lubrications systems and so on. This list can be very detailed and exhaustive to ensure the energy consumption is properly accounted for the intended purpose as per the original specification. Sometimes, it is possible to come up with suggestions to replace the equipment or a process with more energy efficient and/or cost-effective alternative solutions. For example, a heavy duty, high-capacity motor may be reaching its end of life and may have issues with internal windings due to heat stress and also due to lack of routine/preventive maintenance strategies. It may be possible to achieve energy savings through a well-thought replacement plan with a new machine. In many instances, it is difficult to provide maintenance to older infrastructure due to several reasons including phased out technology, non-availability of original equipment manufacturer replacement parts, etc. A third stage of audit usually involve verification of utility bills such as electrical energy and water and then correlating with the energy consumptions; and then undertaking the simulations for 'Energy Saving Opportunities' (ESOs). Many researchers suggested different approaches for determining ESOs and a few software tools are also available for the same. If the client has renewable energy production through small wind turbines and/or solar PV panels on the site, then energy audit requires a different dimension. Such industry clients (prosumers) also may have battery storage systems to feed some of their critical loads from stored energy. In summary, energy audit requirements and layout of ESOs will be specific in case of industrial prosumers (Iorgulescu 2017).

Similarly, commercial clients may have their own requirements, as they may not have very large infrastructure. However, nature of equipment, hours of operation,

energy consumption patterns will be unique and different from their industrial counterparts. Both industrial and commercial prosumers are expected to undertake energy audit on their own through certified specialists by the local regulatory authorities. That said, both industrial and commercial prosumers might not have a strong, newer urge to determine the ESOs, as periodical energy audits would have been in place.

Similarly, the landscape of domestic prosumers will be entirely different as this segment comes under low voltage power distribution systems (Singh et al. 2012; Venkatesan et al. 2012). This landscape is mainly characterized by very high client numbers, widely varying socio-economic demographics, wide ranging capacities of loads and appliances etc. Understanding consumer behavior and then adjusting the tariff structures and even planning the expansion of the existing system are topics of interest to the researchers. However, such studies require first-hand information about all the loads along with the monthly energy bills. Energy efficiency initiative requires identification of all forms of energy usage with the purpose. For instance, to take a hot water bath, usually an electrical heater is used, and the overall energy conversion process involved is inefficient. It is well-known that a roof-top solar system with storage facility can be more energy efficient. Similarly, using a legacy, non-inverter technology-based air conditioner is not energy efficient as the motor runs at full speed all the time. Whereas the contemporary inverter-based air-conditioner is more energy efficient as it employs a controlled compressor system; and thus, the speed is regulated dynamically as per the requirements. There can be many such examples of moving to energy efficient technologies through careful replacement strategy. However, this can be time consuming and expensive since it is basically driven by the end consumers. This also requires appropriate knowledge and awareness on the consumer side; most importantly all the appliances should be professionally benchmarked by a trustworthy and competent authority through a rigorous testing process. Appliance labelling should be done carefully and institutionalized locally for all the products that are normally used by consumers. However, the challenge is how to identify existing and old appliances with different consumers? How to know who has what appliance?

11.2.2 Power Engineering Studies That Depend on Energy Audit Data

DSM and demand response programs need a lot of data about load consumption with respect to time of the day. Which means, utility engineers need to know the daily load curves for individual consumers (especially for commercial and industrial segment) and also distribution feeders heavily loaded with domestic segment. All of the above situations warrant authentic energy audit data from the consumer site. This can be nearly impossible to do, as there will be several consumers. In a typical energy audit, inspectors or trained professionals visit the consumer premises and

manually record different types of loads. However, such audits do not consider the specific appliance or energy rating. Hence, it is not possible for such devices (and hence those consumers) to participate in energy efficiency programs.

If the energy audit is driven by consumers for obtaining the data, then industrial and commercial consumers can provide the data from their previous energy audit reports, since they generally stay compliant to the state policies. However, obtaining data from residential consumers is a big challenge. Roshan et al. (2014) used a manual survey instrument that was provided to all the residents in Phuentsholing city of Bhutan to undertake home energy audit. The information in such a study can only satisfy some of the energy audit objectives; but it is not possible to perform energy efficiency studies, as individual appliance details would not be available.

11.2.3 Impact of Industry 4.0 on Energy Auditing Processes

Thankfully, the fourth industrial revolution provides much robust simplified technology platforms; especially in the mobile and/or smartphones through apps. Hence, it is possible to design user-friendly apps for energy audit with specific objectives so that the wider public can use the same and submit their data. This is essentially nothing but crowdsourcing concept of collecting data and information. This chapter essentially proposes, for the first time; a unique framework and methodology to exploit crowdsourcing concepts for collecting the much-needed consumer appliance data and usage patterns and then providing the information to various stakeholders such as energy planners, utility engineers and the consumers themselves to save energy. However, it should be noted that the energy audit objectives, auditing processes and the nature of ESOs will significantly vary across different consumer types. Thus, a single app may not be able to work for all types of consumers. At the same time, some consumers may have the part and/or full data required readily in spreadsheets or in other manageable electronic formats to submit. Some may not have any information and thus need the help of the app to furnish the same. In any case, capturing individual appliance information is not well treated in the literature so far. If the app is designed properly with features of taking photographs and uploading to the server (just as users take selfies and upload to social media sites) then, it is possible to capture even the appliance information. This means, design of the smart app is more critical to capture energy audit data. However, it should be noted that information collected through apps may contain a lot of noise, errors, etc.

11.2.4 Existing Tools and Approaches

It should be noted that there are a few energy audit apps existing either on Android and/or Apple platforms. Some of them are “energy consumption analyzer”, “emporia energy”, “iSPARK energy audit”, “Energy Efficiency Inspection”, “greenhome

energy audit app"; and many more. These apps have different features as they intend to achieve respective objectives. Some of them offer monitoring the energy in real time, over pre-defined durations of time, energy saving computations etc. While each of them may have their own merits and demerits; it is important to understand their design features and general user acceptance/feedback etc., so that such information and knowledge can be used when designing new types such as the one proposed in this chapter. In the first instance, the philosophy of crowdsourcing is not internalized into these apps as the design objectives are different. Secondly, these apps more or less are meant for individual users, which means the output provided by these apps cannot be generalized and/or used as a standard by a wider cross-section of consumers.

11.2.5 Crowdsourcing Based Applications

Crowdsourcing-based systems are defined in a number of different ways. We adopt the definition that, it is a novel system wherein several users with varied backgrounds are connected to the web and provide resources and solutions for achieving a set of prespecified objectives (Liu et al. 2018; Murturi et al. 2015). Though different works suggested different attributes for a crowdsourcing system (Liu et al. 2018; Raju et al. 2017; Murturi et al. 2015) there are four essential key attributes. They include a huge number of users (crowd), connectivity (internet or cloud), information provided by users and the realized objectives. Though it is obvious that crowdsourcing systems are capable of solving complex, time consuming and even cost intense problems; it is important to understand the core business taxonomy, roles of active and passive users and appropriate use of information sourced (Aris and Din 2016). Thankfully, in the area of energy audit, there are many, different types of consumers and they are all interconnected. However, it is important to understand the taxonomy of energy audit and its internal processes. At the same time it is important to carefully specify the data that is to be sourced from the consumers and this is possible if and only if there is a well-defined computational model to arrive at the output(s), which is(are) the ESO(s). According to Liu et al. (2018) there are three business components in a crowdsourcing system viz.,— (i) value proposition in terms of customer needs, (ii) revenue model in terms of value creation, and (iii) cost model in terms of value transfer. These three components can be safely used even in an energy audit process. Electricity consumers always want to find ways to reduce their electricity bills and their need is the information on what needs to be done. Even the regulators in the energy sector expect bulk energy consumers to determine ways to conserve energy. A well-defined data acquisition from the crowd (consumers) can be of significant value to various stakeholders (value creation) and even the consumers themselves. The outputs of the exercise which are the ESOs are expected to be transferred to consumers (value transferred) for necessary action. Meta data of ESOs is useful to stakeholders and even to non-participating or passive members of the crowd. This chapter avoids

discussion on ESO computations, related equations, etc., since many earlier works have dealt with the same. The focus of this chapter is the application of crowdsourcing principles and only the necessary elements associated with energy audit are treated.

Noise and errors in crowdsourcing and crowdfunding initiatives are well-known issues and over the years various authors (Li et al. 2017; Raju et al. 2017) have reported the same and even suggested a few methodologies to mitigate the same. Such crowdsourcing-based solutions are timely as more and more cities and even countries are undergoing digital transformation and even smart cities are being established (Sastry Musti 2020a). Since the life and ecological systems are driven by cloud-based technologies in futuristic smart cities, such crowdsourcing-based solutions will be more welcomed and supported as the members will be generally more responsible and responsive.

From the above, it can be seen that energy audit itself is a time-consuming process. Different consumers (as in the crowd) do exist that have different expectations (value seeking). Computational processes are different and are dependent on a type of a user and specific equipment; and there can be different solutions. Hence, it is possible to consider the application of crowdsourcing principles to the energy audit problem. Presence of a few smartphone apps for energy conservation or audit indicates that there is a genuine interest in developers as well as users in energy audit. Though several research articles appeared over the years on many aspects of crowdsourcing and its possible applications to different problems, energy audit is not considered thus far. In this context, this chapter firstly proposes the applying crowdsourcing-based energy audit. For this, it examines various stakeholders, technical studies and their respective needs; overall framework for crowdsourcing-based energy audit; design considerations of smart apps and a few practical issues related to its implementation in the field, including data management and end use of the value created.

11.3 Proposed Framework

Since the crowdsourcing application development for energy audit is relatively new, a conceptual framework for the development process is suggested in this work. Figure 11.1 illustrates the overall framework along with seven major stages and other related activities.

11.3.1 Review of Energy Audit Standards

Like any other engineering process, energy audit also requires a comprehensive review and consideration of various aspects. Firstly, it is necessary to understand existing standards for energy audit for different types of customers. It is important to

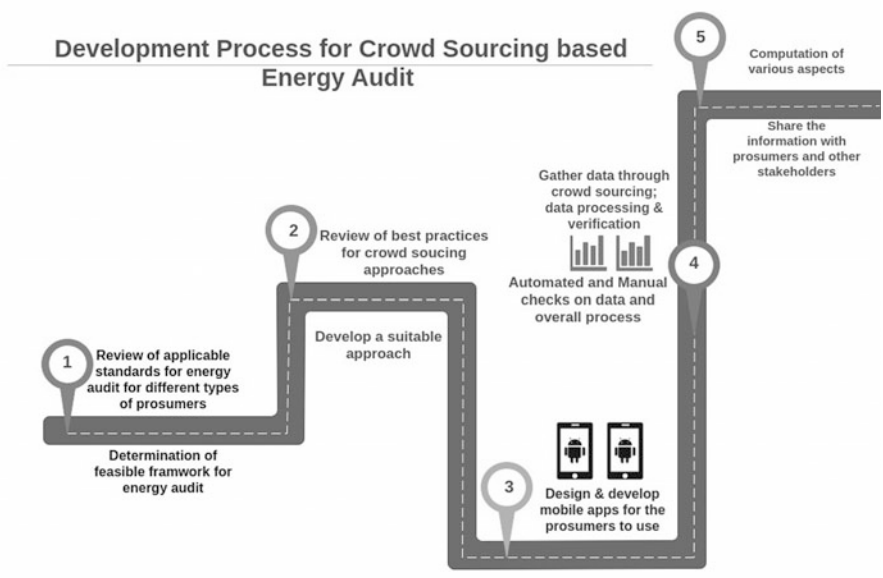

Fig. 11.1 Overall framework for crowdsourcing-based energy audit development process

note that there are no specific standards that mandate or prescribe standards for energy audit itself. This is due to the fact that there can be several different appliances for different purposes. And these appliances may not be used consistently over the day and over the year. The nature of appliances and power apparatus will be different based on the consumer type. At the same time there exist several recommended guidelines and practices for the use of right equipment for a specific purpose. In such a case, the role of the energy auditor is to determine if a specific appliance is used for appropriate, intended purpose or not.

Another aspect that needs to be verified is whether the appliance or the apparatus is properly sized or not. Regarding the power quality aspect, all appliances must be checked if they are in compliance with the expected manufacturing quality standards or not, besides the issues of harmonics that are likely to be generated by them.

11.3.2 Adopting Best Practices of Crowdsourcing

Since this manuscript proposes a crowdsourcing-based energy audit, it is absolutely essential to understand the best practices developing an engineering process based on crowdsourcing and/or crowdfunding philosophy. It is important to understand that the volume and pace of data and information that are normally collected through a crowdsourcing methodology can be very high when compared to other standard and known approaches. One of the challenges actually refers to determining or

understanding best practices in crowdsourcing, since it is relatively new and has not been well used in engineering studies such as energy audit. Another aspect is about the wider participation from the public with varied socioeconomic and educational backgrounds. This warrants the need of an appropriate methodology to ensure the integrity and reliability of data and information. It is almost like impossible to stop the flow of incoming information once the data gathering process starts. The project can be at risk, if there is an error in the process (Kim and Shcherbakova 2011) and that the data needs to be collected again.

11.3.3 Requirements of Stakeholders and Engineering Studies

Besides following best practices for the crowdsourcing approach, it is essential to understand the wider requirements and general interest of stakeholders in the data collected through this process. The energy industry has several stakeholders that may have significant interest in energy audit data and information. The stakeholders include but are not limited to industrial customers, commercial customers, domestic customers, state and municipal institutions, power distribution companies, independent power producers, the regulator and finally the government itself. An in-depth study and analysis of requirements for these users and stakeholders is necessary. Their expectations, roles and some key requirements are discussed separately in one of the following sections.

11.3.4 Design and Development of Applications and Data Collection

Once the comprehensive study of user requirements and best practices and standards is completed, then the next stage is to make use of this experience in design and development of mobile applications or smartphone apps for prospective customers to use. In other words, this stage will focus on designing and development of smart apps to collect the data based on crowdsourcing philosophies. From the above discussion, it is clear that there are different users with different requirements, and this requires development of specific and different smartphone apps. One of the challenges here is to obtain data from industrial consumers. Since they already may have accepted energy audit processes in place, they may not be enthusiastic in participating in the crowdsourcing-based data submission. On the other hand, designers and developers may face challenges in providing a database of equipment and infrastructure that is used by the industrial customers. Wide-ranging apparatus may exist depending upon the class and nature of the industry. Findings on industrial energy audit studies specific to a type of industry have also been published. Rajput

(2016) reported on textile industry and considered it as unique from other industries. Similarly, Arya et al. (2017) reported on the aluminum industry and Kamaleswaran et al. (2015) reported on the coir industry. Given the uniqueness of each industry, designers should provide industrial consumers with user-friendly options to submit data in MS-Excel file or any other suitable format so that the data can be processed for extracting information at a later stage. With this approach, the burden of data submission on the industry can be eliminated. This helps the energy audit system in capturing data related to different types of apparatus and infrastructure and thus building a database becomes easier. More or less the same approach can be safely used in designing a customized app for commercial consumers. The volume and the spread of apparatus used by commercial consumers in general, can be less com-pared to the industrial consumers. It should be noted that both industrial and commercial consumers may not derive extensive benefits by participating in crowdsourcing-based energy audits since they already have an internal energy audit process as per requirements. The case of domestic consumers is of significant interest to the present study. This class of consumers exists in huge numbers. They do not have any internal energy audit process as other classes of consumers. A majority of them may not have adequate knowledge and awareness on energy audit and or on ESOs on the other hand energy tariff structures for domestic consumers are generally far lower when compared to industrial and commercial consumers. Since revenues from this class of consumers is lesser power distribution companies and other agencies may not help domestic consumers enthusiastically in providing information about ESOs at the same time it is very difficult and nearly impossible to make physical visits to each of the domestic consumers to undertake energy audits. This is where crowdsourcing methodology can help significantly where in consumers can submit their own data through a well-designed smart phone app.

Needless to say, the design and the user interface of the smartphone app should be simple and user-friendly to operate. In this process some personal information may be required and this has to be submitted by the consumer through the app. Design, implementation usage and the overall framework should ensure privacy and security of user data. Since domestic consumers may have varied socioeconomic and educational backgrounds, it is important to verify authenticity and integrity of the data. This can be done through a number of ways including correlating the data submitted by the individuals with their respective energy consumption patterns from their respective energy meters. If there are major variations or unexpected data, then physical visits to such consumers should be undertaken to cross-check and verify. Such manual interventions will be useful in improving the data quality. There may be other societal challenges in collecting the data and then to conduct physical visits for verification. This process requires a significant effort in sensitizing the public and to instill confidence on over-all project. Active participation of public is essential for successful data collection.

11.3.5 Value Creation in Energy Audit

Once the data is collected from different consumers the next stage is to carry out automated checks and verification. This stage may help in identifying possible power pilferage issues and also some suspicious and unaccounted energy usage patterns. After completing both manual and automated checks and verifications ESOs need to be computed. This is a huge task by itself since ESOs are typically computed for each individual consumer. Hence, it is a very laborious and time-consuming task. Computational processes differ from appliance to appliance and from customer to customer. Automated and manual checks on the computational processes of ESOs (value creation) have to be designed carefully. The next stage is to share (value transfer) these ESOs with the respective consumers in a very careful manner. For example, ESOs of a specific customer should not be sent to others neither they should be made public. One of the important aspects of the process is to acquire feedback from all the consumers on various aspects of the process and moral framework. Obviously, making necessary adjustments based on constructive feedback plays an integral role in building the trust among the users and stakeholders.

11.4 System Requirements

Though the entire system of crowdsource-based energy audit will have different elements such as hardware, software, users (humans), stakeholders (humans and organizations) and even engineering studies. The requirements of each of these elements can be very different, and a comprehensive illustration of the same can be very voluminous and thus avoided. Only the prominent requirements of stakeholders and engineering studies have been provided, to an extent.

11.4.1 Requirements of Consumers and Stakeholders

Industrial and Commercial Prosumers generally look for ESOs as well as affordable and reliable energy supply. By the regulatory provisions, these classes of customers are required to conduct periodical energy audit typically once in 2 years. They are expected to do so through an independent and qualified energy auditor. Generally, such independent audits provide recommendations and necessary actions that need to be taken over a specific time.

Domestic customers mostly look for affordable and reliable energy supply. They may not be essentially interested in ESOs due to various reasons. One of the pressing reasons can be socioeconomic background and affordability issues. For example, if a comprehensive energy audit may have recommended a domestic consumer to replace various appliances such as refrigerator air conditioner and room heating

equipment; there may not be any action in effect. Though the consumer may understand the economic benefits through energy audit studies and recommendations; they may not be able to invest in replacement of the appliances due to affordability issues. However, it is possible to motivate some of the middle- and upper-middleclass communities to invest in appropriate appliances to achieve ESOs.

State and municipal institutions mostly provide essential and emergency services, and they are typically owned by the government. It is very interesting to know about the policies concerning payment of energy bills by this class of consumers. Some of them may have set policies and procedures to not to pay directly for the energy they consume, or different possibilities may exist for delaying or avoiding payments (Munguia et al. 2020; Opoku et al. 2020). Public hospitals, street lighting, public parks, police stations, magistrate courts and other government buildings come under this category. Another interesting aspect is that conducting a physical visit, inspection for undertaking energy audit can be relatively easy since these are public institutions. However, implementing and recommendations and realizing ESOs can be challenging. Nevertheless, it is important to keep an eye on the energy consumed by these loads, which means that data from such institutions is equally important (Munguia et al. 2020).

Power Distribution Companies primarily look for avenues to maximize the revenues for the energy supplied by them. With the advent of unbundled billing methodologies, it is important for them to identify if every unit of energy supplied is appropriately paid for or not. They also have a responsibility of supplying power in accordance to set standards for power quality and reliability. For this, they need to identify all the appliances and components that produce harmonics. Once they find the sources of harmonics, they have to initiate an appropriate action depending upon the type of consumer. For example, in case of a commercial or industrial consumer, it is the responsibility of the consumer to reduce or mitigate the harmonics or to keep them within certain limits (Jha et al. 2014). Generally, no major action is taken on the appliances at the domestic consumer premises due to logistical challenges and lack of policy framework.

The case of independent power producers can be different when it comes to the data and information generated by energy audit. They need to know energy consumption patterns over the day and over the years. It is important for them as they are in energy trading business and they have a responsibility of supplying energy into the system whenever power is in demand. Typical load consumption patterns vary over the day causing lows, highs and peaks. Distribution companies will be interested in scheduling the generation (and energy purchases) to satisfy varying load patterns (Conteh et al. 2019). This leads to establishing load following power stations or energy purchase scheduling.

The job of a regulator without data and information can be very difficult and even impossible. Regulators have the responsibility of designing the tariff structures from time to time. With the advent of time-of-use tariffs, the task of defining tariff structures has become more complex. For this, they have to keep in mind several aspects such as cash flows, energy flows, varying energy demand requirements and specifically energy consumption patterns of different customers over the day. They

Table 11.1 Summary of stakeholder requirements and roles

Stakeholders	What they look for	Role of Energy audit
Industrial prosumers	ESOs; affordable and reliable energy supply	Very critical
Commercial prosumers	ESOs; affordable and reliable energy supply	Very critical
Domestic prosumers	Affordable and reliable energy supply	Essential
State and municipal institutions	Reliable energy supply	Useful
Power distribution companies	Ways to maximize revenues by ensuring every kWh supplied by them is paid for; identifying power polluting sources and taking necessary actions	Very critical
Independent power producers	Energy consumption patterns over the year; benign policy framework	Very critical

also need to verify energy audit reports, especially the recommendations made by the auditors and then to monitor the corrective actions taken by the consumers to ensure policy compliance. Once the tariffs are in place, the regulator needs to monitor revenues, cash flows and energy flows of the energy companies, so that profits and losses are kept within the set limits. This information can also be useful to the regulator in specifying opportunistic prices, in case a new player is entering the market with a new class of energy.

Various ministries in government require a lot of data and information, so that high-level energy policies can be formulated. At the national government level, it is important to ensure overall energy adequacy, affordable energy access, energy security and sustainable development. To accomplish wider energy access and sustainable development, capacity addition in energy sector needs to be undertaken on a continuous basis. It is well known that adding new power plants can lead to higher greenhouse gas emissions. According to local and international expectations, governments also have responsibility to keep the greenhouse gas emissions within reasonable limits. For this, appropriate and efficient energy use, energy conservation are very critical and recently, principles of circularity are even used for this (Sastry Musti 2020a). This is where periodical energy audits play a major role and recommendations made have to be effectively implemented on a timely basis.

From the above it can be seen that there are different stakeholders with different data information requirements generally their expectations of energy audit are different and specific to the functional activities. At the same time, it should be noted that there can be many other stakeholders and users with their own sets of requirements and expectations. Table 11.1 summarizes the shareholders described above their expectations and the role played by energy audit.

11.4.2 Requirements of Engineering Studies

Besides stakeholders and users there are several different engineering studies that require information from energy audit. These studies include but are not limited to the following: demand-side management, demand response, energy pricing, power quality, energy efficiency & appliance labelling and power pilferage. Each of these is a complex study area by it-self with own set of procedures, guidelines and computational processes. For example, demand side management is expected to change the load consumption patterns of the consumers based on several parameters, including energy availability and time of use over the day (Sastry Musti et al. 2020). It typically uses the time of use tariffs to regulate and motivate consumers to change their energy consumption behaviors. Apart from this, there are several DSM programs such as incentives for avoiding or reducing energy consumption during the peak hours benign financing mechanisms for reducing energy consumption (Sastry Musti et al. 2020; Conteh et al. 2019). Demand response is different from DSM and it is more focused on the adjustments made by the consumers for a specific DSM initiative. It is important to understand consumer response and behavior after setting a new structure of tariff system (Sastry Musti 2020b). Both DSM and demand response studies typically require data to be collected for every 30 min over the day and throughout the year. This is essential as energy consumption will be different over the months based on the seasons, local environmental and climatic conditions, etc.

Energy pricing studies also require the same information as the above two studies. The data is normally used to understand parameters such as price elasticity and consumer behavior indices so that new tariff structures can be formulated. Time of use tariff structures are not used a few decades back. However, they are used at present all over the world, at least for commercial and industrial consumers. This approach typically sets high tariffs during the peak hours. Naturally, majority of the customers are expected to switch off their loads during the peak hours to the possible extent. Electrical loads such as washing machines can be used anytime of the day and not necessarily during peak hours. However, the same is not possible with other loads such as air conditioners and/or refrigerators.

A power quality study is expected to determine the presence and magnitude of harmonics in the electricity supply. This study does not depend directly on the energy audit data. It is important to understand that appliances that produce harmonics, since they not only pollute and distort the regular sinusoidal waves of energy, but also consume higher amounts of energy when compared to devices with good standards. Most energy meters will not be able to detect the additional component of energy consumed due to the presence of harmonics. This causes monetary losses to the power distribution companies in different ways. Firstly, reduced revenues and additional financial and logistical burden to eliminate or avoid overall harmonics in the system. The issues and challenges imposed by power quality are wide-ranging. Physical site visits and equipment testing for detecting the presence of harmonics are well-known techniques to deal with many

Table 11.2 Summary of requirements of engineering studies

Engineering study/analysis	Data and information requirements
Demand side management	Requires data for every 30 min of every day and over a year
Demand response	Requires data for every 30 min of every day and over a year
Energy pricing	Requires data for every 30 min of every day and over a year; price elasticity, consumer behavior
Power quality	Source of harmonics, quality of appliances
Energy efficiency and appliance labeling	Purpose of appliances, quality of appliances
Power pilferage	Identification of illegal/unmetered connections, unauthorized use of electric power

problems that are related to power quality. However, it is possible to detect the presence of harmonics through industry 4.0 based energy audits through crowdsourcing mechanisms. However, research in that area is still in early stages. Similarly, energy efficiency and appliance labelling studies require site visits to determine efficiency, rating and appropriateness of various power apparatus. Given the volume and widespread geographical locations of consumers, such tasks can be prohibitively cumbersome and even impossible to achieve the objectives. However, industry 4.0 based crowdsourcing applications can help in a significant manner if designed carefully as the consumers themselves are expected to provide the data.

Periodical energy audit studies in conjunction with measurement and verification apparatus can be used to detect possible sources of power pilferage. In reality, distribution companies lose a significant amount of revenues due to power pilferage and hence they are generally interested in identification of locations on the power distribution networks, specifically unmetered connections and unauthorized use of electric power. Table 11.2 summarizes the discussion on various system related studies that use data from energy audit directly or indirectly. Apart from these studies there can be several other minor or major study areas that may use information from energy audit.

11.4.3 Prototype Development

From the above it can be seen that energy audit based on crowdsourcing philosophies will have different major stages and also different tasks. These stages and tasks are highly interrelated to one another and even interdependent. This means that if there is an error or fault in any of the stages, then there is a high probability that it can potentially propagate further and adversely affect other stages and tasks. Such errors and faults are commonly associated with any software development process and even in large scale, manual energy audits (Kim and Shcherbakova 2011). It is for this reason; a prototype should be developed. All the tasks in different stages should be performed with this prototype. A comprehensive testing should then be undertaken

on each individual stage and also on the entire process to ensure overall effectiveness of the developed framework. On the other hand, energy audit itself is expected to be done periodically once in 2 years. In line with this expectation, the suggested approach uses a feedback loop that helps in identification of process faults, eliminating the same and to carryout improvements, as necessary. In the similar fashion, even the data collection process should initially be started using the suggested smart app and traditional (manual) approaches so that overall framework for data collection and computational methodologies can help in better understanding the design requirements. For this a pilot study should be undertaken on different consumers, their data should be collected using physical visits and computations should be carried out. Then ESOs and visualizations should be developed using any simple software tool such as MS Excel. In this way many aspects can get clarified. Firstly, nature of appliances logistical challenges typical energy consumption profiles of those specific consumers can be obtained. This is necessary as consumers may have different socioeconomic backgrounds altogether from place to place. During this pilot study a lot of issues can be ironed out and an effective design methodology can be thought out.

11.5 Engineering Design of Cyber-Physical System

Some observations can be made from the above sections. It is possible to use crowdsourcing methodologies to develop necessary framework for energy audit. There are several stages and tasks in such a framework and also different smartphone apps need to be developed. Since the data collected is very huge, this warrants reliable communication infrastructure, central servers with well-designed databases, cloud/client based computational algorithms etc., besides involvement of properly skilled workforce. This situation warrants creation of a cyber-physical system which essentially consists of an enterprise information system. A typical schematic is shown in Fig. 11.2 with various major components.

Since the proposed framework suggests the development of different smartphone apps for different classes of consumers, a good number of algorithms and software applications have to be developed for various purposes. It can be understood that data gets generated at the consumer end, then gets transmitted to central servers and then outputs are expected to reach consumers. This means data flows are bi-directional and parts of the data resides in different parts of the system. Following this, development of computational algorithms and programs need to be done carefully through selecting appropriate technological platforms. For example, data validation algorithms need to be developed for android/apple-based smartphones to filter out unwanted errors and data issues. Such algorithms need to be embodied into the respective apps and expected to stay in the customer devices as part of the installed smartphone app. Since a large volume of data goes into the central servers through the cloud, plenty opportunities exist for developing algorithms for various purposes using edge and fog technologies. When the data and information

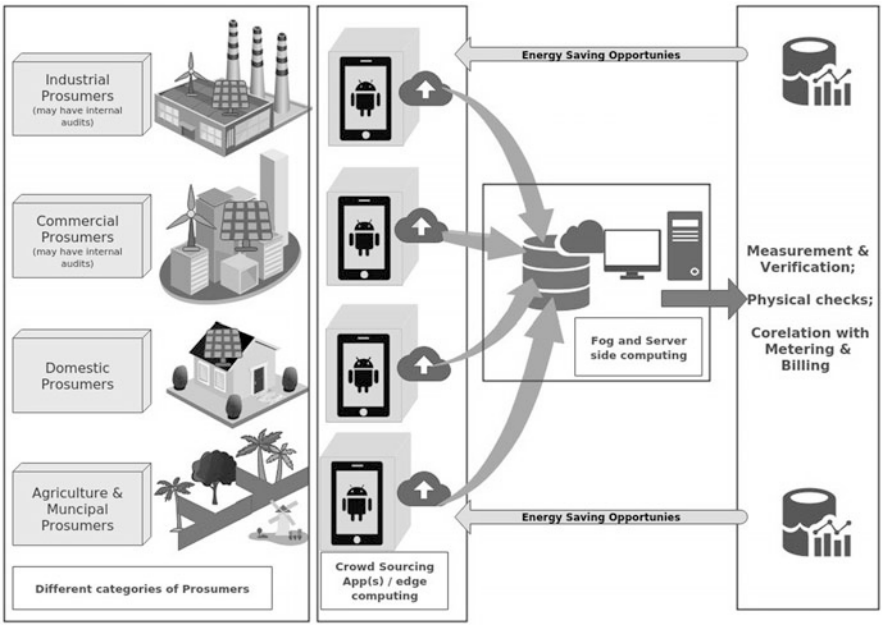

Fig. 11.2 Schematic of the cyber-physical system for crowdsourcing-based energy audit

(as generated by edge and fog applications) finally enter the central servers, further computing can be carried out using server-side applications. Data storage, processing and retrieval algorithms are required to be developed as the final outputs (ESOs) are specific to individual consumers and customized and aggregate reports are required to be generated for various stakeholders as per the requirements. Development of algorithms and computing applications can be quite laborious. Let us consider an example of computing aspects related to verification of the information submitted by a specific consumer with the respective energy consumption as provided by the metering/billing information over a specific time period. This aspect requires picking up of the then tariff structures and then computing the energy consumed by the consumer (based on the then billing criteria, be it telescopic or unbundled) and then correlating this information with the meter readings over the same time period.

One of the major advantages of the crowdsourcing-based approaches for energy audit is the information provided by the consumers about individual appliances that might consume more energy than others. Examples include refrigerators, air conditioners, air-coolers, room heaters, washing machines, water pumps etc. It is recommended that the design of the smartphone apps do support the users in taking photos of their appliances showing the nameplate details and the manufacturer information. This information is essential for energy efficiency and labeling studies. In principle, each appliance should be tested to verify the actual efficiency and then compare the same with expected standards of performance or even with the claims

made by the manufacturers/sellers. Typically, this process provides energy efficiency rating in terms of stars (5-star, 4-star etc.) to indicate its operating performance. ESO computations essentially use existing efficiency status and then simulate a new case with an appliance of higher energy efficiency rating and then compare the results. In the first place, energy audit applications generate energy efficiency ratings for all the appliances of the consumers automatically, besides providing a comprehensive report with ESOs. Even, in case where data discrepancies and/or suspicious levels of energy consumption patterns are detected, then it is possible for the technical staff to check the photos submitted for resolving the matter to an extent. Aggregate information for this approach can also help appliance vendors/manufacturers to determine the potential for new appliances with higher energy efficiency ratings.

In reality, energy efficiency ratings need to be determined by a systematic measurement and verification process. This requires setting up of a facility (or a laboratory) where wide ranging equipment can be tested, and labelling can be done. Obviously, setting up of such facility is capital and operational intense and thus requires a good amount of funding. Since various stakeholders have a significant interest in energy audit information, financial and logistical support can be derived from them to establish such a facility. Generally, a consortium of various companies will be formed to oversee the establishment and general operations of such a facility. The public can be motivated to use the facility and even to encourage a few to provide their appliances for testing. Once testing and labelling takes place on a reasonably large scale, then it is possible to attach the appliances of other consumers automatically without having to physically test them. This means, it is possible to carryout energy efficiency and labeling processes with active participation of stakeholders and the public, which indeed is an example of crowdsourcing or crowdfunding philosophies.

11.6 Conclusion

Energy audit is an important process as it provides recommendations on ESOs and thus it is possible to conserve energy in a big way. However, it is a complex and laborious process by itself and is required to be undertaken periodically due to various reasons. However, the energy audit process has all the required ingredients for applying crowdsourcing principles. This chapter provided a multistage framework and engineering design methodology that can be used to develop an energy audit program using crowdsourcing principles. The suggested framework illustrates how value creation and transfers can be done through distributed crowd participation by providing the data related to appliances and then get benefitted by the value proposition. Since the application of crowdsourcing to energy audit is relatively new, researchers will find several avenues to explore the aspects involved.

References

Aris H, Din MM (2016) Crowdsourcing evolution: towards a taxonomy of crowdsourcing initiatives. IEEE International Conference on Pervasive Computing and Communication, Sydney. https://doi.org/10.1109/PERCOMW.2016.7457122

Arya A, Jyoti, Arunachalam P, Bhuvaneswari N, Kumar A, Ramesh L, Egbert H (2017) Review on industrial audit and energy saving recommendation in aluminum industry. Int Conf Control Instrum Commun Comput Technol. https://doi.org/10.1109/ICCICCT.2016.7988054

Boharb A, Allouhi A, Jamil A, Benbassou A (2015) Analysis of the electrical energy consumption and energy audit of interior lighting for an industrial site in Morocco. In: 3rd International Renewable and Sustainable Energy Conference

Conteh A, Lofty ME, Kipngetich KM, Senjyu T, Mandal P, Chakraborty S (2019) An economic analysis of demand side management considering interruptible load and renewable energy integration: a case study of Freetown, Sierra Leone. Sustainability 11:2828. https://doi.org/10.3390/su11102828

Grebski W, Grebski M, Czerwińska-Lubszczyk A, Jagoda-Sobalak D (2020) Addressing energy efficiency by periodical energy audits. J New Trends Prod Eng. https://doi.org/10.2478/ntpe-2020-0026

Iorgulescu M (2017) Study of energy efficiency in industry. In: 10th International Symposium on Advanced Topics in Electrical Engineering (ATEE). https://doi.org/10.1109/ATEE.2017.7905108

Jha IS, Sen S, Selvakumar SVP (2014) Energy efficiency - potential solution for bridging demand supply gap. In: 18th National Power Systems Conference, NPSC 2014. https://doi.org/10.1109/NPSC.2014.7103868

Kamaleswaran K, Venkateshwaran M, Harinath P, Mydeen MA, Kirubakaran V (2015) Energy conservation potential in rural industry: a case study on coir industry. IEEE Int Conf Circuit Power Comput Technol. https://doi.org/10.1109/ICCPCT.2015.7159444

Kim J-H, Shcherbakova A (2011) Common failures of demand response. J Energy 36:873–880. https://doi.org/10.1016/j.energy.2010.12.027

Li G, Wang J, Zheng Y, Franklin M (2017) Crowdsourced data management: a survey. IEEE 33rd International Conference on Data Engineering (ICDE), San Diego, CA. https://doi.org/10.1109/ICDE.2017.26

Liu Y, Xu Y, Qin S (2018) What are key components when creating an innovative Crowdsourcing business model. In: 24th International Conference on Automation and Computing (ICAC), Newcastle Upon Tyne, United Kingdom. https://doi.org/10.23919/IConAC.2018.8748971

Munguia N, Esquer J, Guzman H, Herrera J, Gutierrez-Ruelas J, Velazquez L (2020) Energy efficiency in public buildings: a step toward the UN 2030 agenda for sustainable development. Sustainability 12:1212. https://www.mdpi.com/2071-1050/12/3/1212

Murturi A, Kantarci B, Oktug SF (2015) A reference model for crowdsourcing as a service. In: IEEE 4th International Conference on Cloud Networking (CloudNet). https://doi.org/10.1109/CloudNet.2015.7335281

Opoku R, Adjei EA, Ahadzie DK, Agyarko KA (2020) Energy efficiency, solar energy and cost saving opportunities in public tertiary institutions in developing countries: the case of KNUST, Ghana. Alexandria Eng J 59:417–428

Rajput SK (2016) Energy audit in textile industry: a study with ring frame motor. In: International Conference on Control, Computing, Communication and Materials, pp 2–5

Raju R, Harinishree M, Lavanya S (2017) The crowdsourcing systems survey work. International Conference on Computation of Power, Energy Information and Communication (ICCPEIC), pp 357–360. https://doi.org/10.1109/ICCPEIC.2017.8290392

Roshan C, Wangchuk K, Sastry MKS (2014) Home energy audit - a case study of Phuentsholing, Bhutan, IEEE conference CSNT-2014, April 7–9. https://doi.org/10.1109/CSNT.2014.208

Sastry Musti KS (2020a) Circular economy in energizing smart cities. In: Handbook of research on entrepreneurship development and opportunities in circular economy. Namibia University of Science and Technology, Namibia. https://doi.org/10.4018/978-1-7998-5116-5.ch013

Sastry Musti KS (2020b) Quantification of demand response in smart grids. In: IEEE India Council International Subsections Conference (INDISCON). https://doi.org/10.1109/INDISCON50162.2020.00063. https://ieeexplore.ieee.org/document/9344531

Sastry Musti KS, Iileka H, Shidhika F (2020) Industry 4.0-based enterprise information system for demand-side management and energy efficiency. In: Novel approaches to information systems design. https://doi.org/10.4018/978-1-7998-2975-1.ch007

Singh M, Singh G, Singh H (2012) Energy audit: a case study to reduce lighting cost. Asian J Comput Sci Inf Technol 2(5):119–122

Venkatesan N, Solanki J, Solanki SK (2012) Residential demand response model and impact on voltage profile and losses of an electric distribution network. Appl Energy 96:84–91. https://doi.org/10.1016/j.apenergy.2011.12.076

Chapter 12
Crowdsourcing for Sustainability: Case of Sustainable Development Goals

Aldo Alvarez-Risco and Shyla Del-Aguila-Arcentales

Abstract Many projects are currently necessary to develop the sustainability commitments that the countries have. In the world in which many resources are destined to the reactivation of economies due to the COVID-19 pandemic, crowdsourcing has gained great importance. On the one hand, green ventures need this crowdsourcing to be likely to develop. Likewise, social media has been recognized as a factor that facilitates the call for crowdsourcing, especially in initiatives that impact the consciousness of Internet users. In this chapter we will detail the various options available to achieve crowdsourcing for sustainability projects, some as disruptive as Ecomuseums, evaluating the trust generated by crowdsourcing initiatives. Also, the role of crowdsourcing in promoting open innovation in sustainability will be discussed, as well as some experiences in some countries that already report crowdsourcing efforts aimed at the development of sustainable projects. Finally, the status of SDG efforts will be reviewed and how crowdsourcing alternatives can specifically contribute to the SDGs will be detailed.

Keywords Crowdsourcing · Sustainability · Sustainable Development Goals · Policy · Policymaker · SDG

12.1 Introduction

The generation of public policies must lead to the participation of various actors in a country (Kendall-Taylor and Levitt 2017), and must be carried out through calls open to citizens, although it is reported that this management approach is not

A. Alvarez-Risco (✉)
Universidad de Lima, Santiago de Surco, Peru
e-mail: aralvare@ulima.edu.pe

S. Del-Aguila-Arcentales
Escuela Naval de Marina Mercante "Almirante Miguel Grau", Callao District, Peru
e-mail: sdelaguila@enamm.edu.pe

R. Lenart-Gansiniec, J. Chen (eds.), *Crowdfunding in the Public Sector*,
Contributions to Finance and Accounting,
https://doi.org/10.1007/978-3-030-77841-5_12

common as in the creation of smart cities (Shelton and Lodato 2019). When the Sustainable Development Goals (UN 2015) are established, which include 17 Sustainable Development Goals (SDGs) and 169 targets relating to global challenges, a governmental agenda is proposed at the global level to contribute to achieving these goals. Six years have passed since the SDGs were launched and in many countries their impact is still not what was expected, which could also be explained by the little knowledge and therefore the little participation of citizens in the implementation process. Monitoring of achievements in the field of SDGs is at the national, regional and global levels. In this scenario, it is necessary to know what the possibilities that the public sector must achieve through crowdsourcing to be able to contribute to the achievement of the SDGs.

12.2 Sustainable Development Goals

The Sustainable Development Goals (SDGs) are an urgent call to action at the global level to work in solidarity to achieve results that allow us to have a better world for all. The SDGs propose actions to generate a reduction in inequalities and at the same time they promote the economic growth of countries, contribute to the mitigation of climate change, preserve the oceans, animals and forests globally. At the business development level, the SDGs propose the formulation of fair work for citizens globally and environments of peace for people. The SDGs are not only about a set of goals focused on the environment as it is usually thought, but they also have a multidimensional approach to sustainable development. Citizens have an active role in contributing to the SDGs, considering that 179 targets must be reached, many efforts are needed for constant monitoring and it is there where citizens can play a crucial role.

Given the complexities of cities, which are multidimensional and dynamic systems, it is necessary to plan projects that can successfully impact the SDGs. When the SDGs are considered in the context of the COVID-19 pandemic period as a tool for the resilience of people and countries. The term resilience refers to the ability to cope with borderline situations and, at the same time, to adapt to changing circumstances. Based on the SDGs, it is necessary to generate the economic reactivation of the countries that have been economically impacted by the pandemic. The poorest people are often the most affected by problems like droughts or pandemics. The approaches to urban resilience are transversal to what is established by the 17 SDGs, with SDG 1 (poverty), SDG 2 (hunger), SDG 9 (infrastructure) and SDG 11 (sustainable cities) being particularly relevant.

12.2.1 Monitoring of SDG: SDG Index

The SDG Index is an annual report of the SDGs that shows a quantitative calculation that is characterized by being standardized, transparent and scalable. As pointed out by Alvarez-Risco et al. (2020a), the SDG Index allows establishing 7 aspects:

1. Eradicating poverty and strengthening equity remain high policy priorities
   In high- and middle-income countries, increasing income inequalities and persistent gaps in access to services and opportunities by income or area remain important policy issues.
2. Human rights and freedom of expression are at risk in many countries
   Warlike and social conflicts in many parts of the world continue to cause setbacks in the progress of the SDGs. The loss of stability in a country causes priorities to move away from meeting the SDGs.
3. High-income countries have significant environmental and socio-economic spillovers.
   A global balance must be achieved at the time of the national implementation of the SDGs, that is, the growth of a country should not be achieved with the negative impact on other countries.
4. High-level political commitment to the SDGs falls short of historic promises
   As of September 2019, out of 43 countries surveyed on SDG implementation efforts, 33 have endorsed the SDGs in official statements since January 1, 2018, but only 18 of them claimed that their core budget documents mentioned the SDGs. This gap between rhetoric and action must be closed.
5. The SDGs can be put into practice through six transformations of the SDGs
   The implementation of the SDGs can be organized along the following transformations: (a) Education, gender and inequality; (b) Health, wellness and demographics; (c) Energy decarbonization and sustainable industry; (d) Sustainable food, land, water and oceans; and (e) Sustainable cities and communities; (f) digital revolution for sustainable development.
6. Trends on climate (SDG 13) and biodiversity (SDG 14 and SDG 15) are alarming
   Countries have not achieved relevant results on SDG 13, even if efforts against climate change appear to be effective. The same applies for SDG 14 and SDG 15, as reported by the Intergovernmental Panel on Climate Change (IPCC 2019) and the Intergovernmental Science and Policy Platform on Biodiversity and Ecosystem Services (IPBES 2018).
7. Sustainable land use and healthy diets require integrated agricultural, climate and health policy interventions
   Seventy-eight percent of the world's nations for which data are available earn a "red grade" for sustainable nitrogen management. A third of food is wasted, 800 million people remain undernourished, 2 billion are micronutrient deficient and obesity is on the rise. However, there is day-to-day information that must be reported to have accurate measurements of the SDGs and for that there is a great opportunity to develop projects based on citizen science.

12.3 Citizen Science as Strategy of Crowdsourcing

Various crowdsourcing initiatives have been identified through citizen science to contribute to the SDGs, specifically in the environmental contents of the SDGs. These efforts are initially projects created from the scientific world but that for their operation have the active participation of citizens for the collection of follow-up data such as the case of detection of plastic accumulation in aquatic areas, reporting of inappropriate educational strategies or inadequate management of water resources). Although it is true, this monitoring is not new since there have always been reports from citizens that serve for monitoring (Sullivan et al. 2009; Liu et al. 2014; Welvaert and Caley 2016; Starkey et al. 2017); however, more and more fields have been incorporated in which citizens can contribute by reporting the modifications in nature that have been evidenced due to climate change (Kammermann and Dermont 2018; Kythreotis et al. 2019; Dawson et al. 2020).

The development and wide dissemination of new technologies, added to global access to fast Internet at prices very accessible to the vast majority, allows applications that are installed on smartphones as well as active participation in social networks has allowed the reach of the contributions of citizens is exponential, reducing the diffusion time of the reports because "sharing" is a very widespread habit in the virtual world, often even without any content filter. However, this wide dissemination allows scientists who access these citizen reports to process them, which previously is subject to huge budgets and is now possible due to the active participation of citizens who seek to be more and more protagonists of the world in the one who live.

These initiatives from the citizens are not currently spontaneous activities but are promoted by the authorities as is the case of the Federal Crowdsourcing and Citizen Science Toolkit, released in 2015 by the United States with the purpose of planning, designing and carrying out a crowdsourcing or citizen science project to help federal employees use crowdsourcing and citizen science to advance the missions of their agencies (https://www.citizenscience.gov). But it is not the only institution that seeks to link citizens with their participation since also the National Oceanic and Atmospheric Administration (https://www.noaa.gov/office-education/citizen-science-crowdsourcing), Bürger schaffen Wissen in Germany (https://www.buergerschaffenwissen.de), SDU in Denmark (https://www.sdu.dk/en/forskning/forskningsformidling/citizenscience) among others.

Even citizens are organized to carry out their reporting activities in a more organized and efficient way, also giving more confidence to the data reported, such as the case of the Australian Citizen Science Association (https://citizenscience.org.au) and the European Citizen Science Association (https://ecsa.citizen-science.net). Events such as the Fukushima disaster in Japan also generated crowdsourcing of citizens to periodically report radiation levels and its effects.

Also, there is also unscheduled crowdsourcing as is the case with what citizens think in times of a COVID-19 pandemic. The detailed analysis of what is expressed on Twitter allows generating public policies considering the opinion and sentiment

of citizens, as did Yu et al. (2020) and Chen et al. (2020). However, crowdsourcing also has some dangers, such as the specific case of the dissemination of information about COVID-19 through social networks, much of which is reliable but other contains printed or even false information, as reported by Kouzy et al. (2020) and Alvarez-Risco et al. (2020b).

Citizen science generates different advantages over conventional science, which was always limited by the resources for its development. Additionally, it can be mentioned that the great advantage provided by citizen crowdsourcing is the obtaining of data that could only be obtained tats way, that is, from the specific places where the phenomena occur and that can have an almost immediate report and by the citizens who live in the surroundings; This becomes very valuable when the report of the same phenomenon is achieved from different parts of the world and for a long period of time (Younis et al. 2019).

12.4 Crowdsourcing in Public Policy Making

Globally, crowdsourcing is increasingly being used when planning new policies or wanting to update them by incorporating current aspects that need to be considered. This ranges from more complex and comprehensive legislation such as a political constitution to specific regulations such as the WIPO regulation on Artificial Intelligence. Through crowdsourcing, institutions seek to involve citizens in the formulation of policies, knowing that the vision of the citizen will be very different from the institutional one but at the same time complementary to the policy that must be formulated. There are several examples of the use of crowdsourcing to formulate new legislation, such as the case of crowdsourcing applied to the reform of the Egyptian constitution (Maboudi and Nadi 2016), Iceland (Hudson 2018), Ukraine (Nikitenko 2020), Brazil (de Lacerda Carelli and de Castro Bittencourt 2020), Argentina (Gelb et al. 2020) and others.

Specifically, Aitamurto et al. (2017) reported the crowdsourcing that took place in Finland to generate constitutional changes. Mainly, the participants were men, educated professionals working full time. Although it was a minority, the women who participated in the process produced more ideas than the men. The crowd was motivated by a combination of factors: fulfilling civic duty, deliberating and learning from peers, changing the law for financial gain, among others. A very relevant aspect that was reported is that citizens participated even though they did not expect their contributions to affect the law. Other interesting case of the experience of constitutional reform in Tunisia due to the Arab Spring led to citizens meeting with their representatives to participate in public deliberation on the constitution and to offer proposals for the constitution. Statistical analysis of more than 2500 citizen proposals showed that 43% of public proposals were included in the final draft of the constitution.

The isolation due to the COVID-19 pandemic has generated greater communication through virtual media, which is why participation when developing new

policies is increasingly popular. Crowdsourcing in policymaking is an open government practice that seeks to involve citizens in democratic processes and infuses government with transparency at multiple levels. Crowdsourcing means an open call for anyone to participate in an online task. Crowdsourcing can be applied in various parts of a policy-making cycle.

Ensuring the quality of the data obtained is a crucial issue in crowdsourcing since, since it is an open door for any citizen to freely provide data, the option of irrelevant, false or confusing information can be given. It is here where the principles of research must be followed that ensure, on the one hand, the quality of the data collection instruments, as well as the evaluation of the data to validate them (cleaning process) and to be able to have the final reliable data that serves to the process of building public policies.

A requirement of the management of the data obtained from crowdsourcing is the storage of the data obtained after the cleaning process so that the information can be reviewed by other citizens who did not participate and may have similar opinions. Also, when you have other legislative reforms, you should have this history of crowdsourcing that allows you to analyze the ideas previously obtained and add them with those that are recently collected to achieve a broader and more valuable source. Likewise, given that current digital media make it easy to recognize who generates a certain contribution to legislation, it is vital that people are explicitly recognized in relation to their contribution to the generation of laws in their country, province or city. Nothing as important as the recognition of the authorities to their contribution in the normative construction that generates benefits to their citizens.

In this scenario of recognition, it is required that the scientific publications in which citizens participate by reporting data to researchers, as well as laws that have the active opinion of interested citizens, mention citizens as part of the intellectual contribution and which have finally contributed effectively to the generation of new knowledge. However, to have a broad vision of what can be obtained with crowdsourcing in the generation of public policies, it is important to know in detail the uses that have been given for many years to crowdsourcing, especially digital, to achieve the report, analysis, planning and changes in people's lives.

Queried SciStarter, an online database of citizen science projects from around the world with 1553 projects registered. In relation to sustainability, citizen science has been evidenced in different reports such as Wildschut (2017), Fritz et al. (2019), Sauermann et al. (2020), Shulla et al. (2020) and Schleicher and Schmidt (2020).

There are different approaches for the reporting of citizens so that they can be organized in a functional way for decision making. To achieve a comprehensive report, they can be approached following the approach of Donabedian (1998) of approach of structure, process and result. Focused on the SDGs and following the Donabedian approach, crowdsourcing by citizens can contribute accord to SDG policymaking. Some examples in SDG 1 to 4 can be found in Table 12.1.

Crowdsourcing can be used in policymaking in different levels as ideation, developing of literature and norms review, ideation, argumentation and deliberation as Fig. 12.1 shown.

Table 12.1 Potential contribution of crowdsourcing report in SDG policymaking

	Structure	Process	Outcome
SDG 1	Availability of anti-poverty programs	Concrete actions carried out by anti-poverty programs	% of people benefited Level of impact of food and agriculture programs
SDG 2	Availability of food and agriculture programs	Concrete actions carried out by food and agriculture programs	% of people are benefited Level of impact of food and agriculture programs
SDG 3	Infrastructure of hospitals and health centers	Availability of medical appointments and drugs in pharmacies	% of patients with controlled chronic diseases
SDG 4	Infrastructure of schools Accreditation of universities	Availability of bachelor level in schools	% de graduate in schools who continue students in universities and technology centers % of graduate of universities and technology centers that work in their professional fields

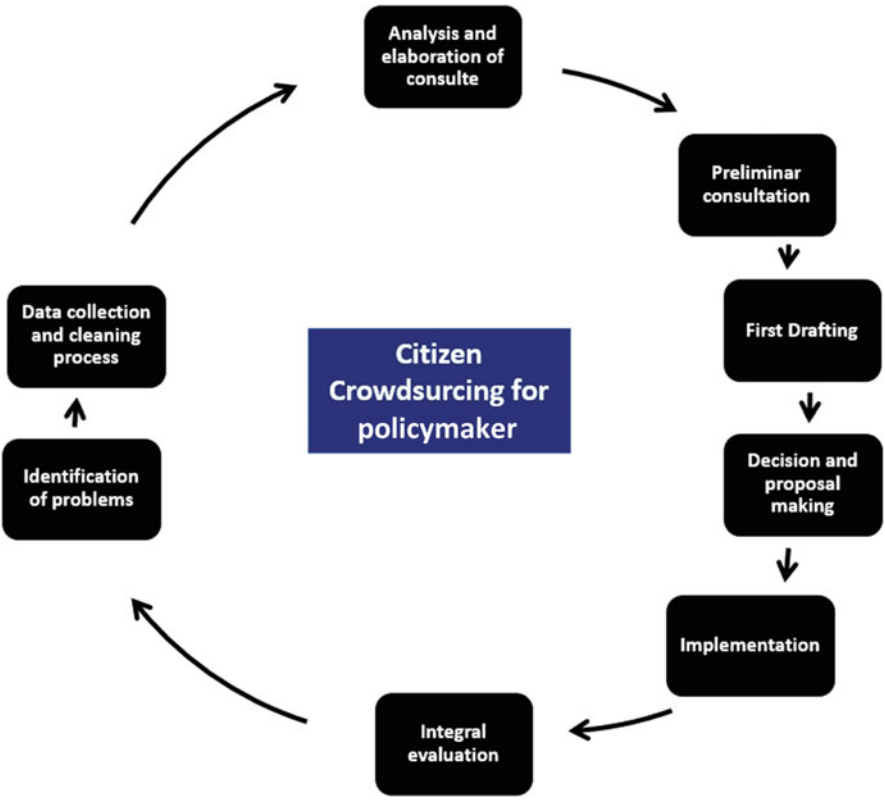

Fig. 12.1 Process of citizen crowdsourcing for policymaker

More recently it has been possible to show that crowdsourcing has escalated to crowdfunding in order to get citizens to formulate and finance their own reform projects. Finally, we must highlight that due to the use of crowdsourcing, the citizens are coproducers of public services. Therefore, they can generate the city and the country that they propose, respect and share.

12.5 Discussion

The participation of people in decision-making in a country is a need that must be addressed by the authorities. In these times, there are a large number of digital tools available that make people's participation much faster and easier. Software such as From the page, Zooniverse and Crowd consortium allow the texts that are written in crowdsourcing activities to be more easily transcribed, compiled, processed and made available to decision makers.

It is also relevant to know that all this effort from citizens to ensure that decision-making is with their real and constant participation also requires tools to capture the expressions in audio, for which there are tools such as Audacity that allows to process the audios of interviews or statements of citizens in an agile way. Likewise, it is used for the generation of podcasts, which will allow citizens to easily report the information from a cell phone when new public policies are formulated.

Although Taeihagh (2017) questioned that crowdsourcing is a new tool for policymaking, there are several countries that have already applied it, but it is still required that more countries and at different levels achieve citizen participation. However, state entities also need to apply crowdsourcing internally because in this way they can gather in the formulation the opinions of the members of the different institutional levels. In this way, young professionals as well as the most experienced ones will be able to express their opinions in such a way that their opinions can be part of the primary proposals.

The current COVID-19 pandemic also needs crowdsourcing since the best measures and regulations will emerge from the citizens since the intimate needs of people can be captured; the same is applicable for obtaining new drugs for specific treatment (Chodera et al. 2020). It is necessary that these crowdsourcing processes can be maximized with the use of machine learning for processing, being able to manage large amounts and types of contributions from citizens for the proposal of new laws (Auerbach et al. 2020).

12.6 Conclusion

Organizations and governments increasingly need to use crowdsourcing so that their employees and citizens can participate in policy making and feel represented. Obtaining diverse opinions allows a broad vision of the problems that must be

solved, so the mission must be not to allow the ideas of the members of an institution or a country to not be heard. The voice of the members must be at the center of the formulation of new normative documents. We hope crowdsourcing will grow at the speed the world needs.

References

Aitamurto T, Landemore H, Saldivar Galli J (2017) Unmasking the crowd: participants' motivation factors, expectations, and profile in a crowdsourced law reform. Inf Commun Soc 20 (8):1239–1260. https://doi.org/10.1080/1369118X.2016.1228993

Alvarez-Risco A, Del-Aguila-Arcentales S, Rosen MA (2020a) Sustainable development goals and cities. In: Building sustainable cities. Springer, Cham, pp 313–330. https://doi.org/10.1007/978-3-030-45533-0_21

Alvarez-Risco A, Mejia CR, Delgado-Zegarra J, Del-Aguila-Arcentales S, Arce-Esquivel AA, Valladares-Garrido MJ et al (2020b) The Peru approach against the COVID-19 infodemic: insights and strategies. Am J Trop Med Hyg 103(2):583–586. https://doi.org/10.4269/ajtmh.20-0536

Auerbach J, Blackburn C, Barton H, Meng A, Zegura E (2020) Coupling data science with community crowdsourcing for urban renewal policy analysis: an evaluation of Atlanta's anti-displacement tax fund. Environ Plan B: Urban Anal City Sci, 47(6), 1081–1097. https://doi.org/10.1177%2F2399808318819847

Chen E, Lerman K, Ferrara E (2020) Tracking social media discourse about the covid-19 pandemic: development of a public coronavirus twitter data set. JMIR Public Health Surveill 6(2):e19273. https://doi.org/10.2196/19273

Chodera J, Lee AA, London N, von Delft F (2020) Crowdsourcing drug discovery for pandemics. Nat Chem 12(7):581–581. https://doi.org/10.1038/s41557-020-0496-2

Dawson T, Hambly J, Kelley A, Lees W, Miller S (2020) Coastal heritage, global climate change, public engagement, and citizen science. Proc Natl Acad Sci 117(15):8280–8286. https://doi.org/10.1073/pnas.1912246117

de Lacerda Carelli R, de Castro Bittencourt AT (2020) Ninjas fazem bico? Um estudo de plataforma de crowdsourcing no Brasil. Rei-Revista Estudos Institucionais 6(3):1289–1309. https://doi.org/10.21783/rei.v6i3.499

Donabedian A (1998) The quality of care. How can it be assessed? JAMA 260(12):1743–1748. https://doi.org/10.1001/jama.1988.03410120089033

Fritz S, See L, Carlson T, Haklay MM, Oliver JL, Fraisl D et al (2019) Citizen science and the United Nations sustainable development goals. Nat Sustain 2(10):922–930. https://doi.org/10.1038/s41893-019-0390-3

Gelb A, Mital N, Mukjerjee A (2020) Hacia la gobernanza en tiempo real: el uso de la retroalimentación digital para mejorar servicios, voz y rendición de cuentas. Estado Abierto. Revista sobre el Estado, la administración y las políticas públicas 4(1):165–179. https://publicaciones.inap.gob.ar/index.php/EA/article/view/136

Hudson A (2018) When does public participation make a difference? Evidence from Iceland's crowdsourced constitution. Policy Internet 10(2):185–217. https://doi.org/10.1002/poi3.167

IPBES (2018). The global assessment report on biodiversity and ecosystem services. https://www.ipbes.net/sites/default/files/inline/files/ipbes_global_assessment_report_summary_for_policymakers.pdf

IPCC (2019). 2019 Refinement to the 2006 IPCC Guidelines for national greenhouse gas inventories. https://www.ipcc.ch/report/2019-refinement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories/

Kammermann L, Dermont C (2018) How beliefs of the political elite and citizens on climate change influence support for Swiss energy transition policy. Energy Res Soc Sci 43:48–60. https://doi.org/10.1016/j.erss.2018.05.010

Kendall-Taylor N, Levitt P (2017) Beyond hat in hand: science advocacy is foundational for policy decisions. Neuron 94(4):708–712. https://doi.org/10.1016/j.neuron.2017.04.039

Kouzy R, Abi Jaoude J, Kraitem A, El Alam MB, Karam B, Adib E et al (2020) Coronavirus goes viral: quantifying the COVID-19 misinformation epidemic on Twitter. Cureus 12(3). https://doi.org/10.7759/cureus.7255

Kythreotis AP, Mantyka-Pringle C, Mercer TG, Whitmarsh LE, Corner A, Paavola J et al (2019) Citizen social science for more integrative and effective climate action: a science-policy perspective. Front Environ Sci 7:10. https://doi.org/10.3389/fenvs.2019.00010

Liu HY, Kobernus M, Broday D, Bartonova A (2014) A conceptual approach to a citizens' observatory – supporting community-based environmental governance. Environ Health 13 (1):1–13. https://doi.org/10.1186/1476-069X-13-107

Maboudi T, Nadi GP (2016) Crowdsourcing the Egyptian constitution: social media, elites, and the populace. Polit Res Q 69(4):716–731. https://doi.org/10.1177/1065912916658550

Nikitenko L (2020) Crowdsourcing as an instrument of participatory democracy. Law Rev Kyiv UL 133

Sauermann H, Vohland K, Antoniou V, Balázs B, Göbel C, Karatzas K et al (2020) Citizen science and sustainability transitions. Res Policy 49(5):103978. https://doi.org/10.1016/j.respol.2020.103978

Schleicher K, Schmidt C (2020) Citizen science in Germany as research and sustainability education: analysis of the main forms and foci and its relation to the sustainable development goals. Sustainability 12(15):6044. https://doi.org/10.3390/su12156044

Shelton T, Lodato T (2019) Actually existing smart citizens: expertise and (non) participation in the making of the smart city. City 23(1):35–52. https://doi.org/10.1080/13604813.2019.1575115

Shulla K, Leal Filho W, Sommer JH, Salvia AL, Borgemeister C (2020) Channels of collaboration for citizen science and the sustainable development goals. J Clean Prod 264:121735. https://doi.org/10.1016/j.jclepro.2020.121735

Starkey E, Parkin G, Birkinshaw S, Large A, Quinn P, Gibson C (2017) Demonstrating the value of community-based ('citizen science') observations for catchment modeling and characterization. J Hydrol 548:801–817. https://doi.org/10.1016/j.jhydrol.2017.03.019

Sullivan BL, Wood CL, Iliff MJ, Bonney RE, Fink D, Kelling S (2009) eBird: a citizen-based bird observation network in the biological sciences. Biol Conserv 142(10):2282–2292. https://doi.org/10.1016/j.biocon.2009.05.006

Taeihagh A (2017) Crowdsourcing, sharing economies and development. J Dev Soc 33(2):191–222. https://doi.org/10.1177%2F0169796X17710072

UN (2015) The 17 goals. https://sdgs.un.org/es/goals

Welvaert M, Caley P (2016) Citizen surveillance for environmental monitoring: combining the efforts of citizen science and crowdsourcing in a quantitative data framework. SpringerPlus 5 (1):1–14. https://doi.org/10.1186/s40064-016-3583-5

Wildschut D (2017) The need for citizen science in the transition to a sustainable peer-to-peer-society. Futures 91:46–52. https://doi.org/10.1016/j.futures.2016.11.010

Younis EM, Kanjo E, Chamberlain A (2019) Designing and evaluating mobile self-reporting techniques: crowdsourcing for citizen science. Pers Ubiquit Comput 23(2):329–338. https://doi.org/10.1007/s00779-019-01207-2

Yu J, Lu Y, Muñoz-Justicia J (2020) Analyzing Spanish news frames on Twitter during COVID-19—a network study of El País and El Mundo. Int J Environ Res Public Health 17(15):5414. https://doi.org/10.3390/ijerph17155414