Reward-based Crowdfunding as a Tool to Constitute and Develop Collaborative Innovation Networks (COINs)

Most people perceive reward-based crowdfunding mainly as a relatively new way to raise funding via the Internet. However, reward-based crowdfunding can be much more than that, especially when it is applied to promote specific purposes of collaborative innovation. It provides a practicable tool to constitute and develop Collaborative Innovation Networks (COINs) that can be applied as a complement to the classical COINs approach. In this paper we develop based on an extensive literature review a conceptual framework of how reward-based crowdfunding can be applied to support the constitution and development of COINs.

The paper is structured as follows: In the next section, we briefly introduce relevant theoretical foundations and the relevant state of research on Collaborative Innovation Networks (COINs) in the context of this paper. In the third section, we do the same for reward-based crowdfunding. In section four, we combine both approaches and present our framework on how reward-based crowdfunding can be applied as a tool to constitute and develop collaborative innovation networks. Finally we present our conclusions and implications for practical applications and subsequent research.

Collaborative Innovation Networks (COINs)

Collaborative Innovation Networks (COINs) can basically be defined as "virtual communities interacting on a global scale … made up of self motivated people who share a common vision, meeting on the web to exchange ideas, knowledge, experiences and to work in a collaborative way to achieve a common goal" (De Maggio et al. 2009, p. 6). Correspondingly, COINs are dynamic social networks, in which actors innovate, collaborate, and communicate on new ideas (Gloor 2006). Main components of their definition are: (1) an evolving community of likeminded people, (2) connected and interacting to a significant extent via digital channels, to (3) commonly pursue to develop and disseminate some kind of innovation (Gloor et al. 2003).

The development of COINs can generally be structured into four phases (Gloor 2017b): First, the network initially originates from an individual initiator or an informal group, which starts an innovative endeavor. Second, a team constitutes around the initiator(s) or the idea. Such a core team is called a "Collaborative Innovation Network (COIN)". It builds the core origin of the innovative endeavor and consists of 3 to 15 people. Third, after further developing the idea within the core

team more likeminded people have to be attracted to the social movement to support the further development of the innovation as well as its dissemination. This stage is called "Collaborative Learning Network (CLN)". Corresponding networks consist of hundreds of people who actively exchange knowledge on regarding topics in the context of the innovation and therefore directly contribute to the development with regard to the content of the collaborative endeavor. Fourth, in the final phase of dissemination the collaborative innovation network needs to reach even more people, most of them only in the role of consumers of relevant information as well as services or products provided on basis of the new innovation. This stage is called "Collaborative Interest Network (CIN)" and often consists of thousands of people who use or further spread an innovation. In addition to the successive phases of COIN development described in this section, the four different roles in the COIN network (initiator, COIN core team, CLN, and CIN) can also be applied to locate or analyze specific actor types in fully established and extended COIN networks after the fourth phase has been completed.

However, the COINs concept and the constituting social networks of its developmental stages are not directly perceivable nor does the concept provide hands-on tools for people to originally constitute (and develop) such networks on their own. Rather the general COINs approach applies a scientific consulting perspective (mainly based on social network analysis methods) to help to optimize already existing social networks for collaborative innovation purposes by evidence-based advice for social network development and virtual mirroring (Gloor 2017a). In this context, virtual mirroring means that specific characteristics of COIN networks are visualized or computed and communicated to respective actors in the network or organization under investigation to provide them a "virtual mirror". This mirroring allows these actors to better reflect on their individual and collective interaction patterns and to adapt their behavior towards more beneficial patterns to enhance specific objectives of their collective, like increases in innovation output or customer satisfaction (Gloor et al. 2017). Respective characteristics to detect COINs are called "honest signals" and cover measures of the structure, dynamics, and content of interactions in social networks (Gloor 2017b).

The COINs approach has been successfully applied in many projects over the last 15 years to detect COINs in organizations and to adapt the behavior of related actors in the corresponding social networks (Gloor 2017a, Gloor 2017b, Gloor et al. 2017). However, at present the COINs framework is more reactive in the sense that it mainly helps to analyze structures of given social networks, detect COINs (honest signals) in it, or to provide recommendations and tools to adapt the behavior of actors in the networks (in particular social network analysis, Condor software, virtual mirroring). What is missing, is an easy applicable tool, which helps potential initiators of an innovative endeavor in a guided process to constitute and further develop a COIN over several stages, even without being educated in social network analysis (even though it would be beneficial for them to be). In this paper we follow

and apply the idea that reward-based crowdfunding campaigns could be such a practical tool.

Reward-based Crowdfunding (RBCF)

Crowdfunding is mainly known as a new way of digital fundraising for innovative projects and ventures, which has become popular over the last years. Instead of asking banks, venture capitalists, business angels, or governmental agencies for funding, project initiators make a direct call via the Internet to a virtually related "crowd" of potential stakeholders for financial support for their endeavor (Schwienebacher and Larralde 2012). Generally, crowdfunding can be defined as an "open call, mostly through the Internet, for the provision of financial resources either in the form of donation or in exchange for the future product or some form of reward to support initiatives for specific purposes" (Belleflamme et al. 2014, p. 588). Supporting this, crowdfunding platforms act in this regard as digital intermediaries in two-sided-markets matching fundraisers and funders via crowdfunding campaigns operated in the platform (Belleflamme et al. 2015).

Such crowdfunding campaigns can apply one of two different campaign models: First, in "all-or-nothing" campaigns project initiators define a certain amount of money they ultimately need to raise via the campaign to be finally able to realize their intended project (the "funding goal"). The amount of money raised on the platform during an all-or-nothing campaign is only paid out to the project initiators if the amount reaches at least this defined threshold. Otherwise after the end of the campaign all pledges are paid back to the backers (Beier and Wagner 2017; Kim et al. 2017; Mollick 2014). Second, crowdfunding campaigns can be run on basis of a "keep-it-all" model. In campaigns of this type the project initiators get the amount raised during a campaign in any case independently of any threshold (Cumming et al. 2019; Haas et. al 2014).

Crowdfunding research differentiates between four specific crowdfunding types in dependence of the kind of goods project initiators offer in exchange for funding they receive (e.g., Ahlers et al. 2015; Beier and Wagner 2015; Belleflamme et al. 2015; Colombo et al. 2015): Initiators can offer equity shares (equity-based crowdfunding), particular interest rates (lending-based crowdfunding), some kind of service or product (reward-based crowdfunding) as well as some kind of activities to achieve a mutually desired or pro-social goal (donation-based crowdfunding) in exchange for funding. In this paper, we focus only on reward-based crowdfunding (hereinafter referred to as RBCF).

RBCF differs to all other crowdfunding types, as it is the only one where funders can receive a product or service in exchange for their financial support. Therefore, mostly funding decisions in RBCF campaigns are less decisions of investors but

more decisions of customers "buying" an innovative product or service as a reward. In this regard, RBCF combines elements from social media and e-commerce (Beier and Wagner 2015). On the one hand, RBCF platforms are specific social media platforms where campaign initiators can present their project by simply uploading texts, photos, or videos (Lai and Turban 2008; Posegga et al. 2015; Wu et al. 2013). Furthermore, crowdfunding platforms offer functionalities of online social networks where project initiators maintain an own profile for their project and can post updates, which are communicated to followers of the project on the platform or via other digital channels (Beier and Wagner 2015; Mollick 2014; Posegga et al. 2015; Xu et al. 2014). On the other hand, campaign pages in RBCF platforms provide projects a web-based point of sale where they can offer their services or products (mainly as "rewards", but also as the overall project outcomes) to potential supporters in the role of customers. Similar to specific product pages in conventional online shops, therefore, campaign initiators have to generate traffic to their individual project page on the RBCF platform and to convert it there to purchases in their campaign (Beier and Wagner 2015; Perdikaki et al. 2012).

Whereas the keep-it-all model makes it easier for project initiators in RBCF campaigns to generate some funding for their project, the all-or-nothing model forces project initiators to further plan their project and to estimate the financial resources they need (Beier and Wagner 2017). In addition, they should make additional calculations about their network of supporters and potential customers, and define what exactly they have to offer them in exchange for their contributions (Beier et al. 2014). From an entrepreneurial perspective, a RBCF campaign is a good tool to bring a funding team in an experimental setting together. The all-or-nothing model, in addition, allows the team to run a proof-of-concept internally (What exactly do we want to reach in the long-term? What could be a feasible but goal-oriented project as a first step of our long-term endeavor? Do we have all resources and capabilities for this project?) as well as externally (Is our idea interesting and relevant for a sufficient number of external stakeholders? Are we able to reach and attract these stakeholders in a certain period of time and with our given resource endowment? Are we able to operate on all communication channels necessary to reach our target groups?).

In the first years, practitioners applying RBCF for their projects as well as scientific research analyzing them strongly emphasized the financial fundraising results as the main objectives of RBCF campaigns. Therefore, most studies so far mainly addressed in their tested hypotheses factors influencing funding success of RBCF campaigns, especially in terms of overall successful funding (all-or-nothing) or total amounts raised in campaigns (e.g., Beier and Wagner 2015; Hopp et al. 2019; Koch and Siering 2015; Kraus et al. 2016; Kuppuswamy and Bayus 2018; Moritz and Block 2016). However, in recent years some scientists began to perceive RBCF also as a collaborative innovation tool and therefore to explore what additional benefits RBCF campaigns provide to project initiators, in terms of community building, co-creation, crowdsourcing, market knowledge, open innovation, or the development

of shared social identities (e.g., Beier et al. 2014; Beier et al. 2019; Brown et al. 2017; Frydrich and Bock 2018; Giones and Brem 2019; Leone and Schiavone 2019; Stanko and Henard 2017; Viotto da Cruz 2016). However, until now this perspective has been applied only in parts by few project initiators in practical RBCF applications. Main objective for most initiators in practice is still the funding they can raise with their RBCF campaign (Beier et al. 2019; Brown et al. 2017).

In many cases, running an RBCF campaign is just a first step of innovative projects. For instance, analyses of Kickstarter data showed that about 90 percent of successfully financed projects went on with their endeavor after their campaign. 32 percent started ventures, which generated more than 100,000 USD yearly revenues and on average 2.2 jobs per successful project (Mollick and Kuppuswamy 2014). On the other hand, initiators of failed RBCF campaigns sometimes use their early learnings during the campaign to further develop their project or to change central characteristics of the project to better meet the expectations of their future market. They just draw their conclusions from their experiences during the campaign and enter the market with their finalized product (Viotto da Cruz 2016). However, (more risk-averse) project initiators, which failed in a RBCF campaign, sometimes try another campaign to proof their adapted concept again, before they go on, finalize their product, and enter the market (Greenberg and Gerber 2014; Leone and Schiavone 2019).

Beside the development of the innovation itself, RBCF campaigns also can help innovative teams to further develop their community around their project (Giones and Brem 2019). One important activity of initiators preparing and running a RBCF campaign is to systematically reach out for relevant stakeholder groups, especially via digital channels (Beier et al. 2014; Giudici et al. 2013; Mollick 2014; Thies et al 2014). In addition to realize the full potential of all relevant stakeholder groups, some project teams also make sure that their RBCF campaign generates them additional access to new people outside their current network for the further development of their project (Beier et al. 2019). For instance, some teams design their whole campaign suchlike that it generates as many email addresses of (new) supporters as possible. Other teams use social rewards in their RBCF campaign (especially events or event series to physically meet their stakeholders and supporters) to build a vibrant community around their project (Beier et al. 2019). In general, many RBCF campaigns find individual ways to tie stakeholders, which have been useful and supportive during the campaign, to their project to be accessible for future activities (Eitenmeyer et al. 2019; Frydrich and Bock 2018).

RBCF for COINs: A Conceptual Framework

The descriptions above on developments in collaborative innovation networks (COINs), of the specific phases, and on teams preparing and running reward-based crowdfunding (RBCF) campaigns show manifold similarities between both approaches, particularly in regard to socio-cognitive developments, social network dynamics, and activities over different stages of project development. Whereas the COINs concept is more a science-based consulting approach to analyze and optimize given innovation networks, RBCF is a practical tool to constitute innovation teams and to promote their (digital) interactions with large networks ("crowds") based on a predefined process. Therefore, it seems valuable to combine both approaches by applying the established logics, process models, and success factors of RBCF to support the constitution and development of COINs. Our respective conceptual framework of COIN development by application of RBCF campaigns is structured in two phases: First, a "set-up phase" where the idea is generated and a COIN is constituted; second, a "scale-up phase" where the core team of the COIN can be further extended with a CLN and a CIN.

Set-up Phase

In the set-up phase one or more initiators have an idea for an innovative endeavor and decide to start a project. In the COINs concept this means that a close network of intrinsic motivated collaborators has to be constituted (Gloor 2017b). However, the COINs framework itself does not provide concrete activities or a predefined process to set up such a COIN. It is more focused on how to detect already existing COINs in social networks and how to moderate the further network development to improve their innovation outcomes. Therefore, potential initiators of a COIN face the challenge how they can initially constitute their COIN. Especially in a corporate context (in and between companies or other organizations) it seems difficult to set up a new innovative movement out of informal activities in a diffuse setting of expectations, requirements, and capacities of potential co-initiators. Regarding the constitution of a COIN, the application of a RBCF campaign provides several advantages (see figure 1):

First of all, a RBCF campaign provides a concrete *starting point* for an innovative endeavor with a project character. It may be difficult to constitute a COIN by starting an informal gestation process within or between organizations and to organize a team around a more or less diffuse idea for an innovative endeavor. A RBCF campaign as a concrete starting point might help to overcome such obstacles.

In this regard, bringing together a group of likeminded people for a more focused RBCF campaign also provides a *concrete project scope* for all participants, defining a first step for the potentially following endeavor. On the one hand, potential collaborators know more in detail what the campaign will be about. On the other hand,

the RBCF campaign is limited and transparent in scope so that the group members only have to give a more *calculable commitment* (in time, resources, and workload) to a first step of the collaborative endeavor. Many examples of COINs processes have been observed in student projects during one semester, which have a similar scope in time and effort (Gloor 2017a).

Even though fundraising aspects are not in the center of this framework, the by-effect of raising funding for the next step of an innovative project by running a RBCF campaign also helps to engage potential team members. The generation of funding (or budget or other organizational resources) of innovative endeavors is often a main problem for informal innovation teams in and between organizations (Chollet et al. 2012; Gao et al. 2014). As a RBCF campaign per se includes the generation of funding for the next steps of the innovative endeavor, it *reduces the need for initial project budgets* at the early beginning, for instance from members of the top management or other organizational sponsors. Furthermore, a successful RBCF campaign might also help to get organizational funding from such parties or other sources after the (successful) campaign (Thies et al. 2019).

In addition, according to the basic ideas of the Lean Start-up concept a RBCF campaign allows an innovation team to test some fundamental assumptions of their approach in an *experimental setting* (Blank 2013). As we will see in the following descriptions, a RBCF campaign also helps an innovation team to find out in a pre-liminary project stage if it really fits together and if it obtains all relevant capabilities and resources to advance the project beyond a certain level.

Set-up Phase	
Initiator(s)	- Starting Point with Project Character - Concrete Project Scope / Calculable Commitment - Reduced Need for Initial Project Budget - Experimental Setting
COIN	- Team Constitution - Shared Social Identity - Segmentation of External Stakeholders - Coordinate/Balance Expectations and Commitments - First Level Proof

Fig. 1. Set-up Phase of RBCF Application for COIN Development

The core team of the COIN is essential for the further development of the innovation project. The *team constitution* for the RBCF helps to identify missing capabilities and resources within the team. Similar to COINs, in RBCF a team of campaign initiators needs to combine different capabilities in regard of knowledge about the innovation itself, operational and management resources, as well as an adequate

level of social capital to successfully run their campaign (Agarwal et al. 2013; Giudici et al. 2013; Hervé and Schwienebacher 2018; Leone and Schiavone 2019; Mollick 2014; Song and Berger 2017; Thies et al. 2014). On the one hand, to successfully develop and spread an innovation it needs an adequate network of supporters well connected to the team members; on the other hand it needs the ability of the team members to reach and activate these contacts via digital and social media channels (Gloor 2017b). Furthermore, well coordinated team processes are essential for campaign development and preparation in RBCF (Beier et al. 2019).

A further challenge during the set-up phase, where the team develops and prepares its RBCF campaign, is to develop a shared "project story" in the team (Beier et al. 2019; Beier et al. 2014). On the one hand, this means that the team really has to work out in detail what they plan to do in their intended project, before they actually start to realize it. On the other hand, they have to develop a *shared social identity* within the team (Frydrich and Bock 2018). This process seems quite similar to the one in the COINs concept, where a team has to develop collective consciousness between each other as well as with relevant members of their stakeholder network (Gloor 2017a; Gloor 2017b). However, the COINs concept provides only communication and interaction related advice on how such collective consciousness can be fostered during the constitution of a COIN. In contrast, the planning and preparation of a RBCF campaign is more concrete and directly applicable during the team constitution. It provides a clear setting and a certain pressure for a project team to storm and norm the team building in form of their first milestone of starting and running a successful RBCF campaign (Tuckman and Jensen 1977).

However, it is not enough that the project story meets the internal requirements and expectations of all team members. In addition it needs an adequate *segmentation of external stakeholders* (in particular potential supporters, customers, and communicators) to prepare a successful RBCF campaign. Therefore, it is necessary that the team anticipates the expectations of specific segments of the crowd and their social contacts to be able to activate them to support their campaign (Beier et al. 2019). On the one hand, this regards to financial support of the campaign. On the other hand, this regards to the motivation for all contacts to spread the story of the innovation project in their community (Frydrich and Bock 2018). Against this background, for successful RBCF campaigns it is essential for the initiator team to develop a sophisticated segmentation of relevant stakeholder groups, including support motives, reward expectations, willingness and ability to pay, online and offline channels to reach them as well as the size of each segment (Ryu and Kim 2016). However, similar considerations in early stages of an innovative endeavor are also essential during the constitution of a COIN (Gloor 2017b). Therefore, also for the further development of COINs it seems relevant to anticipate early the expectations and motivations of relevant stakeholders outside the core team to be prepared for later stages of their network development (CLNs and CINs).

The most common RBCF model of "all-or-nothing" also forces the team members in this early stage to discuss intensely and decide about a realistic scope of their project to define an adequate funding goal for their campaign (Beier and Wagner 2017; Mollick 2014). On the one hand, the funding goal should be high enough to really allow the team to successfully realize the project in the intended scope. On the other hand, very high funding goals compared to the planned activities in the project make a bad impression on potential supporters. Furthermore, the higher the funding goal is the higher the risk to financially fail becomes in the RBCF campaign (Beier and Wagner 2015; Mollick 2014). Therefore, the collaborative discussion and decision on the funding goal for the campaign is also a good occasion to _coordinate and balance the expectations and commitments_ between the members of the innovation team.

Finally, the preparation of a RBCF campaign provides an internal _first level proof_ that the team is endowed with an adequate level of capabilities and resources to at least start a campaign. Eventually given weaknesses regarding resource endowment or low process qualities within the team can be identified in an early stage and failure becomes obvious before the actual innovation project has started. For instance, platform data show that a significant percentage of teams, which already had started to enter their campaign data into the crowdfunding platform, actually failed to reach the point where they really published the campaign on the platform. All these teams got right at the beginning of their collaborative endeavor a valid and clear signal that they were missing some essential resource or capability in their core team to succeed in that constellation. However, a RBCF campaign also allows the realization of learning processes by the team during more than one campaigns or campaign preparations potentially leading to a successful campaign at the end (Leone and Schiavone 2019).

Scale-up Phase

After the invention and the constitution of a core team (during the set-up phase), in the "scale-up phase" the collaborative innovation network has to be extended to reach further knowledge providers ("Collaborative Learning Networks", CLN) as well as users, customers, and other supporters who might be helpful to spread the innovation ("Collaborative Interest Networks", CIN) (see figure 2). Within the COINs approach RBCF campaigns are already mentioned as a valuable tool for these purposes (Gloor 2017b). However, concrete applications have not been specified so far.

On the one hand, a RBCF campaign allows the core team to find out to what extend it is able to attract relevant stakeholders for the further _development_ of the innovation. This is in line with the idea of CLNs in the COINs concept and regards mainly the further technical development of the solution as well as business collaborations, which help to enhance the quality of the finally resulting innovation. For instance, RBCF campaigns can help to establish new partnerships with companies

and organizations providing complementary knowledge, technologies, or services to the own innovative solution (Beier et al. 2019; Hervé and Schwienebacher 2018). Also during the development and preparation of the RBCF campaign, potential partners can be approached to define and offer collaboratively a reward for the campaign. Therefore, RBCF campaigns provide a good opportunity to get in touch with new partners and to test with them potential fields of collaboration. In addition, during their running RBCF campaign initiator teams also are able to identify specific individuals or informal groups in their environment, which obtain knowledge or capabilities relevant for the further development of the project and to integrate them into their CLN. For many active supporters of RBCF campaigns, for instance, to get in touch with the people behind the project is one of the central motivations for their engagement (Gerber et al. 2012).

Scale-up Phase	

CLN	- Development
	    ▪ Technology Development Partners
	    ▪ Business Development Partners

CIN	- Customers
	    ▪ Pre-Market Check
	    ▪ Prosumers
	- Communicators
	    ▪ Communication Partners
	    ▪ Digital Word of Mouth

Fig. 2. Scale-up Phase of RBCF Application for COIN Development

On the other hand, RBCF campaigns can help a core team of a COIN to better estimate the extent of interest for their resulting product or service in the market (Gloor 2017b). Therefore, another group of relevant external stakeholders perceives a RBCF campaign more from a _customer_ perspective. This is in line with the idea of CINs in the basic COINs concept, where actors' main interest in an innovation lays mainly in their own usage of it (Gloor 2006). Basically, RBCF campaigns provide a "pre-market check" of the general interest for the topic or the concrete demand for specific solutions of an innovation (Beier et al. 2014; Viotto da Cruz 2018). More concrete, RBCF campaigns also provide manifold information on preferences, buying intentions, and willingness to pay about potential customers (Agrawal et al. 2013; Brown et al. 2017; Hervé and Schwienebacher 2018). During a RBCF campaign many stakeholders offer ideas or communicate their preferences, for instance, in the comments of the campaign page on the crowdfunding platform, in online communities (e.g., communities on upcoming gadgets, new technologies, or environmental topics), or in social media communications about the running campaign (Agrawal et al. 2013). In addition, the portfolio of rewards as well as specific customizable rewards often offer supporters various opportunities to engage as "prosumers" in activities of collaborative co-design (Piller et al. 2005). Detailed information on user preferences and customer needs, however, can be derived

to a much further extent, if a RBCF campaign has been especially designed as an experiment mainly to generate such information about the target markets of the innovation; for instance, with specially designed rewards (including respective choice options and according prices) (Beier et al. 2019). In this regard, the experimental logic of the Lean Start-up approach can be applied to that extend, that a COIN team designs its RBCF campaign specially to test central hypotheses for their intended innovative endeavor (Blank 2013).

Another set of relevant stakeholders in line with the CINs in the COINs concept are actors mainly in a role of _communicators_, aggregating and transferring information and messages about an innovative endeavor, a running RBCF campaign or a new product or service. In this regard, an adequate preparation for a RBCF campaign also includes a systematical acquisition of (potential) communication partners for the campaign. Therefore, an initiator team seeks for media coverage or collaborations with other communication partners like cross postings in company newsletters or posts of relevant influencers in the field (Beier et al. 2019). Such activities help to extend the reach of the core team to better spread the innovation. Another set of relevant activities to prepare and run a successful RBCF campaign is the promotion of (digital) word of mouth (Bi et al. 2017; Stanko and Henard 2016; Thies et al. 2014). On the one hand, this means that initiator teams need to establish adequate presences in relevant social media channels. On the other hand, in addition the team has to provide a continuous news stream to keep the communication waves in their own digital channels as well as of their connected communicators going (Kraus et al. 2016).

Conclusions and Implications

In this paper we developed and presented a conceptual framework of how RBCF can be applied to support the constitution and development of COINs over all stages. With this framework we intend to inspire innovators and innovation teams to perceive RBCF as more than just another opportunity for fundraising. As described in this paper, a RBCF campaign can be a helpful and practical tool to set-up and scale-up collaborative innovation networks. Therefore, RBCF campaigns can be applied complementarily to the scientific consulting approach of the original COINs concept. However, in the opposite direction practical applications of RBCF campaigns also could benefit from further usage of social network analyses in line with the COINs concept. Future research might analyze how honest signals and virtual mirroring could be applied to investigate social networks of RBCF teams and their communities to foster different kinds of campaign success as well as the further development of innovative projects after a RBCF campaign.

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