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Antecedents and Consequences of Crowdfunding Science

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Abstract

The phenomenon of crowdfunding science is a new topic and only anecdotal evidence exists for its use. In the past couple of years, there has been an increasing use of specialized science crowdfunding platforms, where researchers seek funds from the crowd to conduct scientific research. While the crowdfunding concept, especially crowd-investing, has been widely studied by practitioners and scholars alike, no scientific literature exists for the crowdfunding of science. By conducting a broad explorative study, with an inductive-deductive approach, this study is one of the first attempts made to understand what the antecedents and consequences are when crowdfunding science.

As a point of departure, relevant literature on crowdfunding, science funding, science communication and public policies are explored. A review of the literature from different scientific discourses is undertaken in order to inductively find relevant antecedents and consequences when crowdfunding science. With the methods of 'triangulation' and 'theoretical sampling', primary data is collected from 15 interviews consisting of 4 different sample groups. Likewise, with respect to the same methods, secondary data is collected from a variety of external sources. The primary and secondary data is analysed using a coding process method of 'pre-coding', 'open coding', 'axial coding' and 'selective coding' using the NVIVO software. Additionally, in order to gain a better understanding of the sub-categories of each antecedent and consequence and the relationship between them, a concept map becomes a necessity for the purpose of this study. The concept map shows the relationships the antecedents and consequences have to one another.

The result of this study indicates, that there are a number of motivational factors for researchers and crowd-donors to participate in crowdfunding. Likewise, there are also deterrents for researchers wanting to crowdfund science. There is a number of factors that influence the amount of funds that fund-seekers can raise with the crowdfunding of science mechanism. Such influences are: the skills of the researchers, the network of researchers, the attributes and characteristics of the crowdfunded projects, the help received from the science platforms and the pre-set funding goal of the crowdfunded science campaign. In addition, crowdfunding platforms play an important role and influence for the crowdfunding of science ecosystem, by their internal and external quality control mechanisms.

Furthermore, the findings of this study reveal that there is an amount of influences that determine whether or not crowdfunded science projects have a real impact and relevance for scientific advancement. The findings of this study further show that crowdfunding of science has many consequences for researchers, crowd-donors and universities who participate in it. In addition, there is some indication of a spill over effect from the crowdfunding ecosystem onto stakeholders who are external to its ecosystem. This spill over effect results in consequences for the relationship between the scientific community and the public, as well as for the consequences for science funding and public policies.

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1.0 Introduction and outline of the study

In industrialised countries, there is nowadays an increased interest in the importance of scientific research in creating the foundations for technological change and economic competitiveness (O E. C. D. 2000) In addition, research and innovation is the cornerstone of nations competitiveness and growth strategy and most of the scientific breakthroughs are coming from Europe with 30% of the world total knowledge creation. The European Union has allocated a budget of around 9 billion aimed to finance research and innovation and improving the European quality of life. In addition, this funding also aimed to "help to improve the EU's key position in modern sciences and its leadership in industrial innovation" (European commission, 2014). However, some people say that Europe is in comparison to other nation at this moment, not enough capable of transforming its scientific capabilities into value for society. Some authors say that we lag behind other nations in innovativeness' and competitive abilities, because Europe fails to bring affordable goods and service branded with "made in Europe" to the market (Schmitt, 2013) as a result of a lack of scientific - industrial engagement (Tindemans, 2014).

In recent time there have been some changes in the relationship between academic institutions, science community, industries and society. The proof of these changes can be illustrated by the work of Ziman (2002) on post academic science, the paper of Gibbons et al. 1994) on knowledge edge production and most importantly the triple helix of university government industry relation in the study of Leydesdorff and Meyer, (2006). Recent global forces have made industry donations to research decrease (De Wit et al. 2007), as such government does no longer have the means to fund all type of research. Research institutions such as universities have seen budget cuts for their research practices (Zusman, 2005), while at the same time researchers and scientists are being put under pressure to demonstrate their duties in conducting effective research (Hessels et al. 2009).

The way we conduct research has lately been scrutinized for a range of different reasons. The first problem is how we fund and bring scientific research to the market via peer review and journal publication (Plunk, 2013), the second challenge is the validity of the scientific research made (Ioannidis, 2005), the third is the funding mechanisms used for scientific research (Fang, 2011) and the last one is the knowledge gap that exists between the scientific community, the industry and society (Sinatra et al. 2014). Many countries nowadays are not only experimenting with new models to bridge the knowledge gap that exists between science and society, they are also trying to find new ways on how scientific research can add value to society in general. We have already seen some anecdotal evidence of new innovative processes such as open innovation (Chesbrough, 2003) and crowdsourcing (Poetz and Schreier, 2012), in which universities and researchers are seen as "part of the creation of knowledge" in such models (Hessels 2009).

Because of the difficulties to obtain funds for research and the changing paradigm in science, we have seen some signs that researchers have started to look for funding of their research projects from alternative sources and one of these mechanisms is crowdfunding. Gaggiol and Riva, (2008) argues that crowdfunding is a possible tool to cope with the lack of investments in research as well as the proliferation of the democratization in science i.e. bridging the current existing knowledge gap that exists between science and society. Researchers participating in crowdfunding will have to be proactive with crowd-donors, throughout their research campaign (public engagement) and learn to effectively build awareness about their research projects (Gerber and Hui, 2013).

Crowd funding of science platforms open up a whole new pool of funds for pilot and high risk projects that would previously not be funded by scientific bodies (Byrnes et al. 2014). Some argue that crowd funding has major benefits for science, since it allows small scale research projects to bypass the time and trouble required to draft and defend a grant proposal, and find funds to cover all start-up cost (Patel, 2015). Others argue that crowdfunding of science will not only provide researchers with a new source of funding, but will also close the knowledge gap between science, the industry and society as well as increasing public interest in science and broaden the dissemination of scientific research (Gerber and Hui, 2013).

Some critics however, claim that the amount of money that can be raised through the crowdfunding mechanism might not be high enough to have a real impact on the advancement of science. In addition, some fear that money funded via crowdfunding platforms could be used in an unethical manner because of the lack of guidelines within different crowdfunding platforms (Celyagd 2014). Others believe that crowdfunding will only fund sciences that have a populist appeal and as a result, crowdfunding will ignore other projects that might have a larger contribution to the academic community and society (Grey, 2015). Critics further argue that crowd funding of science does not have any institutional guidelines nor transparent accounting practices on how the crows-donor's money is spent, possibly leading scientists and researchers to use funds in an unethical or irresponsible manner (Patel, 2015).

It therefore becomes important to gain more insight in the crowdfunding of science phenomenon and whether or not it is a good mechanism for funding and conducting scientific research, especially in terms of its antecedents and consequences. In this study the research question is: what are the antecedents of crowdfunding science and what can the consequences of crowdfunding science be. Antecedents, refers to priory factors of influence for crowdfunding science and the consequences aim to find out what will happen after crowdfunding science.

1.1 Outline of the study

Abstract & Acknowledgement

Chapter 1 Introduction

Chapter 2 Literature review, research gap and research question

Chapter 3 Methods and data collection

Chapter 4 Results

Chapter 5 Discussion

Chapter 6 Consclusion

In this study the question arises: what are the antecedents of crowdfunding and what can the consequences of crowdfunding be. The study is composed of six chapters, beginning with the abstract, acknowledgement and table of content. In the first section of **chapter one** I have already presented an introduction to the thesis with an explanation of the current stage of science, what is meant by crowdfunding science and what this study aims to achieve. In the second part of chapter one, I aim to present an introduction to crowdfunding platform mechanisms and the crowdfunding of science.

Chapter two will present a literature review of the current state of the art of 'crowdfunding' and 'science'. This chapter ends with the proposal of an inductive conceptual framework. The chapter will also present a discussion of the inductive conceptual framework followed by a research gap and a research question. After the description of the research gap and the research question, a chapter four will ensue where the methods of data collection and data analysis are described.

Chapter three introduces the methodological considerations which result in the choice of an exploratory inductive-deductive study and the use of triangulation and theoretical sampling as a means of data collection. Additionally, the chapter accounts for the selection of the method for data analysis where coding methods (such as pre-coding, open coding, axial coding and selective coding) were used, with the help of the NVIVO software. In the end of chapter four, an inductive-deductive conceptual framework, together with a conceptual map showing the relationships between the categories found, during the coding process will be presented.

Chapter four will present the findings from the coding process including: factors of motivation by researchers and the crowd-donors to participate in science, deterrents for participating in crowdfunding, factors that influence the amount of funds that can be raised in crowdfunding, the role and influence of crowdfunding of science platforms and the impact and relevance of crowdfunding, consequences for researchers, crowd-donors and universities as well as the influences crowdfunding of science has on society, science polices and the public. **Chapter five** will provide a discussion section regarding, the results obtained from the study as well as the implications the results from the study, have for different crowdfunding stakeholders, followed by a limitation of the study and area for future research. **Chapter six** offers concluding remarks of the study and is followed by an appendix and a bibliography

1.2 Introduction to platforms and the crowdfunding of science

Crowdsourcing is argued to be an antecedent of crowdfunding by many authors in the crowdfunding literature (Rubinton, 2011), (Kleemann et al. 2008). Crowdfunding draws inspiration from concepts such as micro finance where crowdsourcing is the outsourcing of a given task to a large group of people in the form of an open call (Howe, 2006). Crowdfunding can be explained by the action of small contributions being pulled together to contribute to a common goal (Ahlers et al. 2015). Schwienbacher and Larralde (2010) were among the first to study the crowdfunding phenomenon, where they defined crowdfunding in their study as:

"An open call, essentially through the internet, for the provision of financial resources either in the form of donation or in exchange for some form or reward and or voting right in order to support initiative for specific purpose"

The intermediaries used in crowdfunding are platforms which serve as an infrastructure, give rules, and give the possibility to facilitate the transactions between the fund seekers and the crowd-donors (Eisenmann et. al. 2006). Platforms can further be seen as enablers of innovation by permitting problem solving capabilities, facilitating knowledge sharing and reducing transaction costs (Nambisan, 2009). The first crowdfunding platform "Sellaband" originates from 2006 and was considered as the pioneer of crowdfunding. Sellaband gave crowd-donors the possibility to financially support the production of artists and in return, they would receive a small reward, such as a CD or a small portion of the sale revenues when the album was released (Kappel, 2008). Since the launch of "Sellaband" many other crowdfunding platforms emerged such as the well-known Kickastarter and Indiegogo.

The Massolution (2013) report shows the popularity of crowdfunding projects where the study indicated that 'social causes' were among the most active crowdfunded projects with 30% of all crowdfunding activity, followed by 'Business & Entrepreneurship' (16.9%), 'Films & Performing Arts' (11.9%) 'Music & Recording Arts' (7.5%), and lastly 'Energy & Environment' (5.9%). According to the same report, North America and Europe are the nations with most crowdfunding platforms and therefore account for most of the total crowdfunded volume.

The inexistence of the crowdfunding of science in the Massolution (2013) study indicates that crowdfunding science is still scarce. Even though the crowdfunding of scientific research is still in its infancy, there is anecdotal evidence that the mechanisms of crowdfunding have already been used by scientists in academia and by independent researchers. The reasons for these researchers to crowdfund their scientific projects on crowdfunding platform are still unknown from an academic perspective. However, some researchers say that crowdfunding gives the possibility to share research in an easy format with the general public and allows the crowd to influence future research directions, by providing funding and ideas (Gerber and Hui, 2013). Furthermore, from the introduction of this study, some other possible advantages of

crowd funding science are mentioned, such as coping with the lack of investments in research as well as trying to bridge the gap between science and society.

Currently the majority of scientific crowdfunding occurs on specific scientific crowdfunding platforms rather than general crowdfunding platforms such as Kickstarter and Indiegogo. This may be due to the different nature of scientific research as compared to creating consumer products and services for consumers, which are found on general crowdfunding platform (Hui and Gerber, 2013). Today only a few platforms for crowdfunding science exist. Some of the current science platforms can be summarized as followed: Experiment. com (United states), Walacea.com (United Kingdom), Sciencestarter.de (Germany), Pozible.com (Australia), Scifundchallenge.org (United states), Futsci.com (United Kingdom) and intrumntl.com (United States).

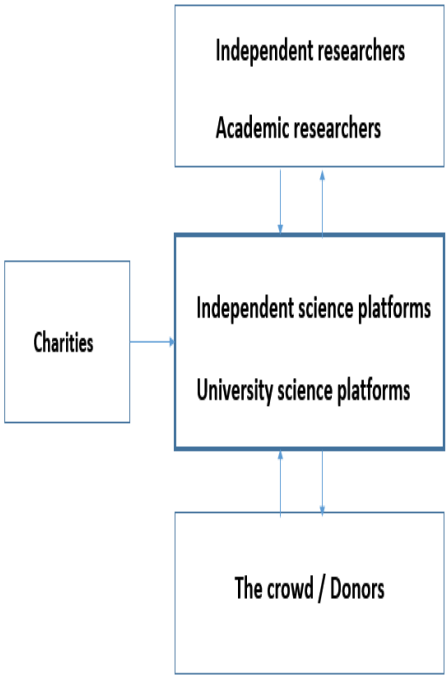


Figure 1 Crowdfunding of science ecosystem

As can be seen in the figure 1, crowdfunding of science platforms have close ties to universities, because academic researchers (fund-seekers) are regularly posting research projects from their university directly on independent crowdfunding of science platforms. It is not uncommon that independent and private researchers (fund-seekers) also crowdfund their research via these crowdfunding platforms.

However, the participation from independent researchers is less frequent than their academic counterpart. There is also new evidence that universities have begun to develop their own internal crowdfunding of science platforms where the crowd and the public (crowd-donors) can donate directly to the university research projects via those platforms (Shipman, 2013). Such examples of crowdfunding of science platforms can further be seen in the University of Groningen (the Netherlands), and UCLA university (United states). Charities have similarly become a part of the crowdfunding of science both for university and independent platforms, where these charities can donate directly to different scientific projects via the crowdfunding platform itself, instead of going through other donation based-channels.

2.0 Literature review and research question

As stated before in this study the central research question is: What are the antecedents of crowdfunding and what can the consequences of crowdfunding be? In the early stage of this study it became clear, that academic literature on crowdfunding science is mostly non-existent and most of the discussions around crowdfunding of science are based on popular press. However, literature on crowdfunding exists, although it is based mostly on other types of crowdfunding models and not specifically on the crowdfunding of 'science'. Because of the lack of literature on the researched topic, it becomes necessary to look into different fields of scientific discourse such as science communication and public-scientific policies. As a first step a literature review is undertaken in order to inductively find possible relevant factors in the process of crowdfunding science: on the basis of the findings from this literature search at the end of chapter two a general conceptual model will be proposed that will function as a guideline in interviews to be held with stakeholders within the crowdfunding process.

2.1 Science funding, public policies and innovation in science

There are several difficulties of assessing the literature for science funding, because the public research policy literature is often restricted to one country and the specific public policies that each country has. Therefore, making broad generalisations of the public funding policy literature becomes difficult, but without going too deep into the literature some tentative generalizations can still be made. Public research is funded with public funds and is carried out by public research institutions such as universities. The allocation for scientific research comes from national and local government and these funds are often paid by public tax. Some examples of these national agencies include the research council in the UK, the tri-council agencies in Canada and the national institutes of health research and the national science foundation in the United States (Ennis, 2013). The justification for governments to support public research is based upon the classical failure argument, where markets do not have enough incentive to support research because public science is not appropriable.

Appropriability in relation to scientific and technological knowledge for creating intangible goods - means how an agent can take advantage of the benefits generated in the process of application of this knowledge (Kreimer and Thomas, 2001). In addition, it is quite difficult to estimate the economic value of research, especially for basic and explorative research due to knowledge spill overs and imperfect intellectual rights (Nelson, 2002). Another stream of the public funding policy literature is concerned with the way public funding for research is redistributed once collected. There are some discussions about how to best allocate science funds based on their scientific disciplines, i.e. physics, social science, technology etc. There is

some criticism in the allocation of science funds, since some types of research disciplines receive bigger or smaller part of the governmental funding cake (Schmitt, 2013).

From the literature two mechanisms are offered to allocate funds for research, i.e. the block grants based regime and the project based regime. Block grants regimes imply that research funds are given directly to research institutions such as universities, according to a set of criteria and performance indicators. After that, these funds are redistributed to the researchers. Controversy, "ear-marked" block grants regimes are often only meant to cover salary costs and permanent staff which may not be enough for scientists to conduct research programs. In project based funding regimes researchers write an application themselves to different science agencies in order to obtain science funds. These applications often imply that researchers are competing with each other in order to obtain science funds and this process is also referred as 'grant applications' (O.E.C.D, 2011). Many countries, including the United States have shifted away from the block grants system toward the projects based granting approach. Even though many countries have taken a project based approach some countries are still favouring the block based distribution approach, especially countries within the European Union (Lepori et al. 2007).

Innovation in research is an important factor for the advancement of society as a whole, since innovative research projects may lead to scientific breakthroughs (Kuhn 1962). However, innovative ideas which can lead to breakthrough discoveries are not always welcomed by the scientific community (Barber 1961). Innovation is a term linked to an implicit connotation of newness, permutation, modification, transformation and change. Berezin (2001) comments that innovation in scientific research does not have any relation with the amount of grant money researchers or institutions receive from block or project based funding. According to Berezin (2001), a small amount of funding averaging 1/6 of the typical amount awarded from the funding systems could lead to innovative scientific breakthroughs.

However, scientific communities and the peer review systems that accept or reject grant applications have a tendency of funding low risk and mainstream research. Some authors of the public funding policy literature argue that the grant and funding agencies who accept grant applications are conservative by design (Fang, 2011). Scientific funding agencies, being conservative by design are further agreed upon by (Baldwin et al. 1997) who clarify that funding agencies, such as the NIH have a tendency to accept safer applications where preliminary data exists, prior to the acceptance of scientific grants. Researchers of the public policy literature argue that the scientific conservatism that exists in science, is a hindrance to scientific innovation (Dosi et al. 2006).

2.2 Grant application process

As stated in the introduction crowdfunding has major benefits for science, since it allows researchers to bypass the time and trouble required to draft and defend a grant proposal that often take a long time to process (Patel, 2015). It therefore becomes important to further investigate the grant application process, in order to draw similarities and notice differences when crowdfunding science. When exploring parts of the literature on science funding and public funding policies, your find general scepticism on how researchers obtain funds for their research. According to many authors of the literature, it has become a routine activity for researchers to apply for different governmental grants offered by the project based regimes. Scientific grant applicant's spend a lot of time writing and trying to secure research grants, which can be seen as an opportunity cost for conducting actual research instead (Spier, 2002). In addition, more and more researchers are applying for grants which means that each individual's chance for getting research funds is ultimately decreasing (De Solla Price and Price, 1986; Lingard et al. 2008). Therefore, some researchers end up with no research money even though they want to conduct research. In contrast some researchers end up with more research funds than they actually need for conducting their research, leaving out funding for other researchers wanting to conduct studies, creating an imbalance in the funding system (Berenzin, 2001).

Evidence from the literature further suggests that young researchers in academia face a fiercer environment for receiving research funds in comparison to their senior counterparts. This has to do with the peer review process for getting research grants in which the criteria's for receiving funds make it difficult for new and early-career scientists. Funds for scientific research is often allocated on reputation, past track record, past scientific success, and the prestige of the academic institution researchers work for (Fang, 2011). Receiving research grants are further dependent on the number of articles published in journals by the researchers, the reputation of the journals, the authors international connections (co-authored) and past approved research fund applications and the number of patent received (Melin and Danell, 2006). Since new and early career researchers often lack reputation, past track records and past publications, it becomes difficult to that young demographic of researchers to receive any funds to conduct research. Young and less experienced researchers also face problems of accreditation, framed with the term "Matthew effect". This accreditation dilemma was first explained by (Merton, 1968) who described that eminent researchers get proportionally more credits for their scientific contributions in comparison to relatively unknown scientists for comparable contributions. Cole and Simon (1981) showed in their study that grant committees could agree upon whether or not the top and bottom 25 percent should receive grant funding, the middle 50 percent is determined on random choice or the particular reviewer rather than on scientific merits. The study further indicated that eminent researchers had the same chance as younger scientists to receive grants but eminent researchers have more resources to apply for more grant applications, hence getting more grants in the long run.

2.3 Scientific knowledge gap

Gaggioli and Riva, (2008) argues that crowdfunding science is a possible tool to cope with the lack of investments in research as well as the proliferation of the democratization in science i.e. bridging the current existing knowledge gap that exists between science and society. Because the author argues, that crowdfunding science may bridge the existing knowledge gap that exists between the scientific community and the public, it becomes important to explore the topic of the 'scientific knowledge gap' in more depth. Loui Figuier in 1867 stated that "science is sun; everybody must move closer to it for warmth and enlightenment". This metaphor explains that the sun, representing science shines for everybody and not just for an elite or a happy few. It was the understanding at that era of the nineteen century that everybody should seek to gain an understanding of science and the scientific process, where science was made understandable to the public in a practical manner (Bensaude-Vincent 2001). Mass communication of science was encouraged in order for the public to gain access to scientific knowledge and there was the assumption that scientific knowledge was a necessity for the everyday life of the citizens.

During the twentieth century science communication changed, and today we have seen an un-democratization of the scientific process. There is the argument that scientists and the public live in two different worlds and many concerns have been raised about the scientific illiteracy that exists among the general public (Maienschein, 1999; Sinatra et al. 2014; Bensaude-Vincent, 2001; Bucchi, 2008). Byrnes et al. (2014) argues that the lack of public engagement in scientific research is because citizens fail to see the link between science and its application and that the public has limited insight into scientific achievement (Schmitt, 2013). The lack of public insight to science can be further accentuated because most scientific articles are not accessible to the public, because of the high-cost to acquire them via scientific portals, hence framed with the term "scientific Ivory tower". In addition, the communication of science to the public via media channel remains limited. Dunwoody et al. (1986) estimates that around five percent of the newspaper coverage is allocated to scientific discoveries, where most of these newspapers place heavy emphasis on story brevity and simplicity, instead of covering large scientific topics.

Currently taxpayers are paying twice for research; the first time by paying government taxes and then by paying for the subscription to access scientific knowledge via research papers in scientific journals. There is further evidence from the science communication literature that scientific knowledge doubles every five years, however, the access to this knowledge remains limited, which leaves parts of the public in the proverbial dark in relation to scientific knowledge (Fecher and Friesike, 2014). The disparities that exist in this knowledge distribution further widens the knowledge gap between scientists and non-scientists creating controversies in science and distrust of the public for science and scientists (Priest, 2001). In addition,

researchers and scientists are in turn becoming more reluctant to communicate efficiently and on a standard basis with the public about their research projects (Mikulak, 2011).

Because of these concerns of science illiteracy among the public, the widening knowledge gap and the non-participation of the public in science and science decisions, there are discussions on how to close these gaps. Two common terms used in the literature for closing the gap that exists between the scientific community and the public are “democratization of science” and “democratization of scientific expertise”. A number of scholar believe or have at least argued that the democratization of science will create benefits for society in the form of increased knowledge production (Burke et al. 2016). One way to democratize science is to engage citizens in a meaningful and deliberate way with science experts, hence creating a committed knowledgeable society (Felt and Wynne 2007). There is evidence from the concept of ‘citizen science’ that the public is interested in participating and contribute to scientific research. Citizen science can be explained as when “the public is involved with researchers in a form of research collaboration in scientific projects to address real world problems” (Wiggins and Crowston, 2011).

However even though most scholars from the literature argue that the democratization of science is a good idea in theory, they also mention that such endeavours are not easy to implement on a practical level. First, because mass media are seen as a very poor tool for the remedial of science education, instead there needs to be an incorporated mechanism within the scientific process to communicate and educate the public about science. Secondly, the public cannot be seen as a whole, it must be approached as a whole with subdivisions and segmented by different interest, abilities, resources and needs, which makes effective science communication even more difficult to implement in practice. (Logan, 2001).

2.4 Science communication

From the literature on science communication the authors of this study can deduce that science communication has a relation to the knowledge gap that exists between scientists and non-scientists as explained in the previous chapter. It therefore becomes important to further explore the science communication literature. Science communication is defined as "activities that scientists engage in, to communicate their research to the public outside the scientific community and build awareness, interest and understanding” (Byrnes, et al. 2014). The same author argues that the scientific community does not reward science communication enough, hence the reason for the gap that exists between the scientific community, the public and society. Byrnes et al. (2014) also argues that the lack of science communication exists because such practices can be time consuming for scientific researchers and hinder the development of their scientific publication, productivity and reputation among peers.

Shanley and Lopez (2009) conducted a survey of 268 researchers from 29 different countries. In their study the authors observed the amount of science communication that researchers practised. The survey revealed that even though most scientists thought science communication was important to address scientific issues, few of the researchers conducted public communication and engagement activities. In addition, Kreimer et al. (2011) shows in their paper that researchers do not practice public outreach and science communication because of the pressure to generate funds and conduct research for peer review publication which dis-insensitive them to practice science communication. Mizumachi et al. (2011) revealed that researchers were unwilling to engage in public outreach because these researchers deemed the science communication process to be time consuming, outside the scope of their work and puts pressure on confirming norms about what researchers do. They also discovered that researchers do not perceive science communication practices as a benefit and they worry about speaking directly to the public.

Furthermore, scientific institutions, such as universities typically promote top down communication of their scientific results where journalists have a passive role for screening out these research findings and communicating them to the public. This process of communicating research is argued to be inefficient and the need exists for a broader direct and active science communication by the scientists to the wider public (Burke et al. 2015; Logan, 2001). Some scientists use intermediaries to communicate their research and while such intermediaries could be useful, it creates missed opportunities for researchers to build a direct connection with the public which is a necessity for the coproduction of knowledge (McNie, 2012). Although researchers must report their results and the process of their research projects to the various research agencies that funded their research such as the BIH and scientific agencies within the European Union, most of these agencies do not report back the researcher's findings to the public.

However, science processes have recently begun to change where researchers have been pressured by external science bodies to participate and exercise more science communication activities and to make more efforts in making science understandable to the public. This school of thought is especially indulged by the stream of literature of 'open science' that wants to make science more accessible and more understandable for the general public. Cribb and Sari (2010) state the following ''Science is by nature complicated, making it all the more important that good science writing should be simple, clean and clear". Many scholars in the field of science and technology, now seem to agree that scientific experts and researchers need to share their knowledge to the public and to the wider communities in order to; regain trust from the public and for the scientific discourse to regain its legitimacy (Lövbrand et al. 2010).

2.5 Legal and political factors in crowdfunding

The legal and political stream of the crowdfunding literature mainly deals with the equity based crowdfunding model and so far limited literature on legal and political factors exists for other types of crowdfunding models. Equity based crowdfunding means that crowd-donors invest in product and service on various crowdfunding platform in return for financial shares of the company producing those products or services. The main part of the legal and political crowdfunding literature is concerned with legal and regulative framework in order to protect the fund-seekers and crowd-donors in crowdfunding. Such literature explores legal perspectives of the job act originating from the United States (James, 2013; Martin, 2012). The crowdfunding literature on law and political regulations also aim to find new ways in creating a joint legal framework within the European Union due to the different laws and regulations regarding crowdfunding, that exist for each of the different member countries within its borders (Bedino and Castrataro, 2012).

The literature shows that it is important to find ways in which fund-seekers are able to obtain funds for their entrepreneurial ventures in an easy way across geographical boundaries without a complicated regulatory framework. In addition, legislators are becoming more interested in the crowdfunding mechanism, since these platforms are likely to fund highly innovative ventures, making crowdfunding a contributor to innovation, employment and economic growth (Cordova et al., 2013). Some small parts of the legal and political literature of crowdfunding, deals with the possibility of actor committing fraud with the crowdfunding mechanism. De Buysere et al. (2012) point out that, fraud is perhaps the most widely debated factor and issue for critics, of crowdfunding with the argument that crowdfunding creates a potential for scams. According to De Buysere et al. (2012) the issue of fraud in crowdfunding could arise because fund-seekers and crowd-donors do often not have any form of personal contact, also called information asymmetry. When crowd-donors make investments for example, they do not have any real idea of what is happening with their investments since they merely act on the information given by fund-seekers on the crowdfunding campaign page.

2.6 Motivation of crowd-donors and fund-seekers to participate in Crowdfunding

The motivational factors of fund-seekers and crowd-donors to participate and donate in crowdfunding has been widely explored in the crowdfunding literature. The literature on motivational factors to participate in crowdfunding ranges across crowdfunding platforms and the funding model such as the donation based model, the equity based model, the reward based model and the lending based model. The motivational factors to participate in crowdfunding differ greatly from the crowdfunding literature. However, the frameworks used to classify the motivational factors show some similarities. Some authors of the literature use intrinsic and

extrinsic motivational frameworks as seen in the work of (Kleemann et al. 2008), while others divide the motivational factors of crowd-donors and fund-seekers in an altruistic and non-altruistic context and other authors even use alternative classification methods.

2.6.1 Motivation of fund-seekers.

The factors of motivation to participate in the Canadian platform *Istockphoto*, showed that financial reward, the possibility to learn something new, networking, having fun and peer recognition are factors that motivate fund-seekers to participate in crowdfunding (Brabham (2008). In further study on the subject, Belleflamme et al. (2010) establish that fund-seekers motivation to post projects on crowdfunding platforms are to get the following; public attention, raising money and obtaining feedback on products or services. A similar study shows that fund-seekers motivation to participate in crowdfunding where to raise funds while maintaining control of the project, receive validation from the crowd, to connect with others, to replicate successful experiences of others and to expand awareness of work through social media (Gerber et al. 2012). In addition, Ordaninini et al. (2011), found that the motivational factors of fund-seekers to participate in crowdfunding were based solely by the prospect of financial returns and the desire to be pioneers of using crowdfunding as a mechanism to make investments.

Gerber and Hui, (2013) performed a study across a wide range of different crowdfunding platforms by conducting 83 semi structured interviews in order to understand what drives fund-seekers to participate in crowdfunding. Their study revealed that the motivation of the participant range from; raising funds, expanding awareness at work, forming connections, to gain approval, maintaining control and gaining new fundraising skills. Adams (2013) found in his study that the motivational factors of fund-seekers to participate in crowdfunding is because the crowdfunding mechanism is perceived less risky than other type of fund raising mechanisms.

One cited argument as a deterrent to participate in crowdfunding is that once new products and services are launched on crowdfunding platforms, the products and services become visible to competitors, which can discourage entrepreneurs to participate and raise funds in crowdfunding (Reidl, 2013), (Adams, 2013). Gerber and Hui, (2013) also analyzed the deterrents of fund-seekers to participate in crowdfunding and they found that the deterrents are; Inability to attract supporters, fear of public failure, exposure, time and resource commitment.

2.6.2 Motivation of crowd-donors

Gerber and Hui (2011) found from their study that crowd-donors were motivated to participate in crowdfunding in order to obtain a reward, help others with money, skills and expertise, becoming part of a community and supporting a good cause. The same study reveals that the deterrent for crowd-donor's participation in crowdfunding can also be a distrust in the way their funds are used by the fund-seekers. Lehner, (2013) further explores the motivation of crowd-donors to participate in the crowdfunding of science and the development of drugs for rare diseases. This research shows that charitable giving and the desire to advance treatment options are the most prominent motivators for the crowd to participate in the crowdfunding of medical science. In addition, Burtch et al. (2013) found out that the motivation of the crowd to participate in the crowdfunding of journalism is solely based on altruistic reasons.

A similar study on the crowdfunding of journalism is done by Jian and Shin, (2015). Their study found motivations for donating in crowdfunding to be the following: a lack of news coverage and the desire to fill the 'journalistic gap', belief in freedom of content, altruism and making a contribution to their communities. Moreover, a similar study about crowdfunding of art portrays that crowd-donor's motivation to participate in crowdfunding was because donors want to be recognized as part of an artistic community and are wanting to invest in arts for the art's sake (Boeufs et al. 2014). Van Wingerden and Ryan (2011) further classified the motivational factors of the crowd to participate in crowdfunding into an intrinsic and extrinsic framework. Their study revealed that the intrinsic motivational factors were: control of use of an innovation, improvement of current circumstances, enjoyment and sense of belonging. The extrinsic motivational factor from the same study was financial reward. Ordanini et al. (2011) further added public recognition and patronage to the list of extrinsic rewards to the study first developed by Van Wingerden and Ryan (2011).

2.7 Factors of influence for getting projects funded and completed in crowdfunding.

The factors that have an influence on the amount of funds that can be raised in crowdfunding and the factors that influence whether or not a project gets successfully completed in crowdfunding, have been widely explored in the crowdfunding literature. Factors of influence in this stream of crowdfunding literature further investigate how the fund-seekers skills, ability, networks, friends and family influence fund-seekers capabilities for reaching their funding goals. Cordova et al. (2013) show that the probability of success and the extent to which fund-seekers reach their pre-set funding goals and overfunding for their campaign (the amount of funding above the amount initially asked for) depends on the projects characteristics such as project funding goal and the duration of the campaign as well as the behaviors of crowd-donors.

Further research on the subject shows that there is a need for efficient communication from the fund-seekers with the crowd (Schwienbacher and Larralde, 2010). There also is a need for networking and proper rhetoric in the use of videos and the presentation of the campaign page (Mitra and Gilbert, 2014; Mollick, 2014). Segelmark and Ocieczek (2014) found that the rhetoric used in videos to communicate with crowd-donors influences the crowds funding decisions, after having analyzed 63 reward and donation based campaigns. The amount of advertising efforts and the intensity of placing updates of the project advancement, especially in the last week of the crowdfunding campaign tends to increase the likelihood of reaching the pre-set funding goals (Qui, 2013). In a similar study, on the rhetoric used in equity crowdfunding campaigns, the author found that the title of the project, the visual expression available in form of video and images and a correct description of preparedness in form of risk and challenges of the crowdfunded project, greatly influenced the success of getting funding in equity based crowdfunding (Berg & Lovéus, 2014).

Further research shows that having back-up from friends and family, being able to build trust with the crowd, being prepared and having a concrete plan are factors that influence whether or not fund-seekers will succeed with their crowdfunding campaign (Mollick, 2013; Schwienbacher and Larralde 2010; Agrawal et al. (2010). Gerber and Hui (2013) make similar remarks regarding their study, which implies that crowd-donors are more likely to invest in people they trust and people they have a relationship with, even though, these relations are geographical distant. The same study shows furthermore, the importance of having friends, relatives and other acquaintances especially in the beginning of a crowdfunding campaign. Wechsler (2013) found similar results by investigating 230 respondents from different crowdfunding platforms in which the author concluded that a social network and receiving funds from family and friends influenced the success of funding a crowdfunding campaign. Ordanini et al. (2011) and Agrawal et al. (2010) further conclude the importance of having a large network of family and friends in the beginning of the funding period. Their study namely concluded that the first investors in a crowdfunding project tend to be relatives, friends and family. In addition to family and friends, fund-seeker's social networks such as Facebook and Twitter are an important influence in the success of a crowdfunding campaign. This is due to the circumstance that these social networks offer the following: a platform to connect with fans and friends, a platform to provide information about the crowdfunding campaign and a platform to receive support (Mollick, 2014; Bechter et al. 2011).

Further studies from the literature have shown that first pledges are important in a crowdfunding campaign, due to the herding behaviour of crowd-donors. Herding behavior means that crowd-donors tend to base their decisions on the behavior of earlier crowd-donors. This behavior is believed to be caused by the limited investment information that crowd-donors possess when investing in crowdfunding projects (Banerjee, 1992; Kuppuswamy and Bayus, 2013; Smith et al. 2015; Burtch et al. 2013). On the same herding topic, Mollick (2014) suggests that high quality projects will attract crowd-donors who may promote the project to other crowd-donors and media channels, hence cresting snowball effect's and increasing the

projects probability of success. Colombo et al. (2015) found that fund-seekers who do not have large group of friends, should be more active as crowd-donors themselves on different crowdfunding platforms. The study namely suggests that crowd-donors reacts positively, if fund-seekers themselves are active crowd-donors of other campaigns on the crowdfunding platform.

The funding amount asked for (the pre-set funding goal prior to start of a campaign) in crowdfunding has also been studied by a number of different authors in the crowdfunding literature. Authors studying this stream of research primary investigate whether or not there's a correlation between the success of a crowdfunding campaign and the funding amount asked for by fund-seekers. Previous research has shown that a longer crowdfunding campaign does not perform better in relation to the amount of funding raised during a campaign (Mollick 2014). In a similar study made by Jian and Shin (2015) on the crowdfunding of journalism, the authors found that most of fund-seekers can only go to their family and friends a limited number of times to receives funds. Because of this limited occurrence of help from family and friends, the authors argue that family and friends, as a source of funding, do not provide fund-seekers with a great amount of money. Huili and Zhang, (2014) applied optical scaling regression methods in their study to find the influential factors affecting crowdfunding project based on 314 projects on different crowdfunding platforms. Their research found that the project success, in terms of the amount of money raised during the pledge period, was influenced by economic factors, the amount of crowd-donor's participation, trust, information quality and social network. The same study further concluded that crowd-donor's participation had the highest influence for the project financing success.

2.8 Platform theories in crowdfunding.

Another smaller part of the crowdfunding literature deals with crowdfunding platforms and the perceived legitimacy of the platform, information asymmetry between fund-seekers and crowd-donors as well as the principal-agent theory. Platforms serve as an intermediary in crowdfunding, and therefore platforms influence the amount of moral hazard and adverse selection that can occur with the actors who are part of the platform. According to Cumming and Johan, (2013) the type of crowdfunding platform that crowd-donors uses could be a sign of the quality of the project. Their study showed that crowd-donors prefer to invest in crowdfunding platforms that are well regulated, where platforms have an internal pre-screening process. Crowd-donors prefer to invest in platforms with these criteria, because those crowdfunding platforms are perceived to attract superior or higher quality fund-seekers and therefore reduce the investment risk of crowd-donors. On another notice Mollick (2013) found that crowd-donors knowingly or not, identify the same variables of quality as venture capitalists would do, when investing in equity crowdfunding. The only exception on this theory is that

crowd-donors have less geographical bias in comparison to venture capitalists. Wash and Solomon (2011) further discuss in their studies which type of crowdfunding model is best suited for platforms in a crowdfunding setting, the "all or nothing" model or the "keep what you get" model.

2.9 Inductive conceptual framework

As stated at the beginning of chapter 2, the literature review was undertaken in order to inductively find possible relevant (hypothetical) antecedents and consequences in the process of crowdfunding science. On the basis of the findings from this literature search a general model can be presented which will function as a guideline in interviews that will be held with stakeholders within the crowdfunding process. The framework will also help in the coding process (data analysis), by reducing the need for a complete open coding paradigm by having some, already pre-defined core categories. Having such guidelines restrains the possibility of data overload, by being selective on the amount of primary and secondary data that needs to be coded (Ridder et al. 2014). Later on this framework will be further revised and completed deductively after the collection of primary and secondary and the analysis of the data.

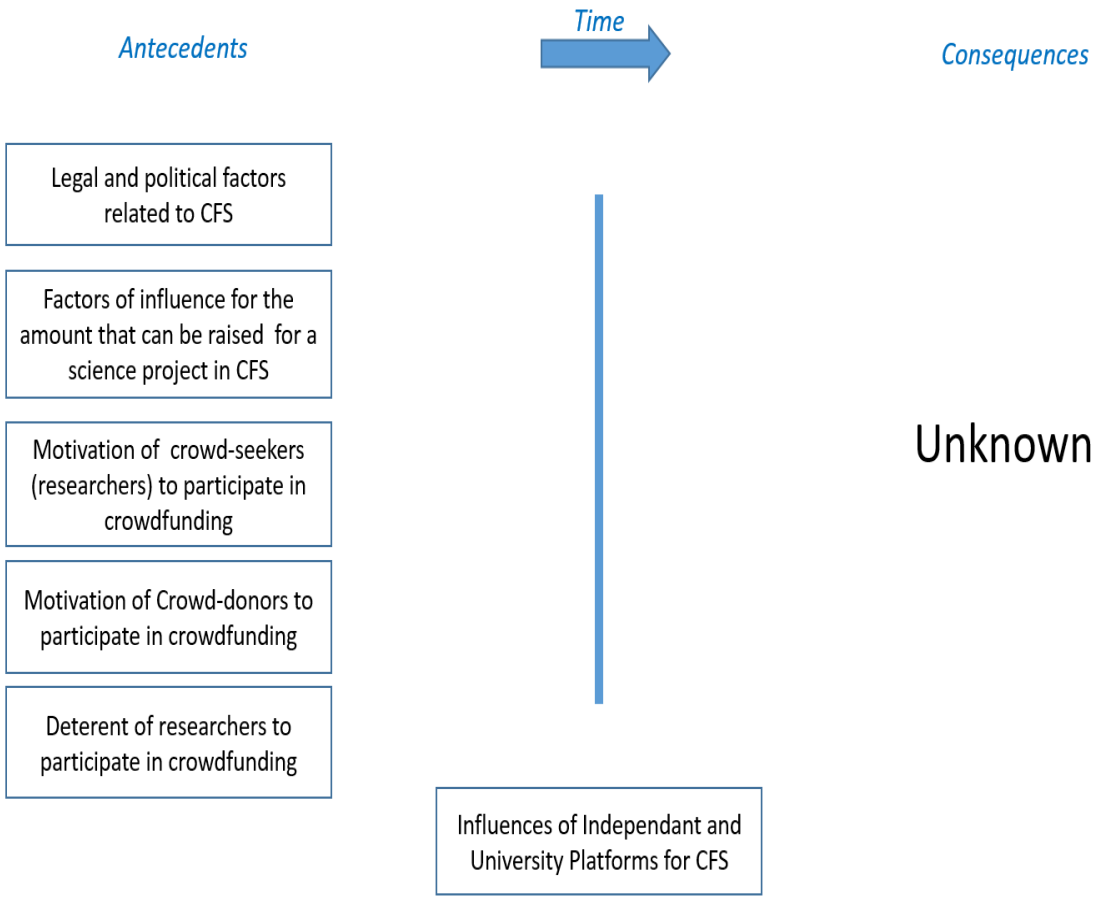


Figure 2. Inductive framework

As seen from figure 2, there are a number of 'antecedents' that were found from the literature review. It is important to notice that some time overlap may exist between the different 'antecedents'. Factors of influence for the amount of funds that can be raised in crowdfunding are factors of influence that are most likely to occur prior to crowdfunding science. Likewise, are the motivational and deterrent factors of fund-seekers and crowd-donors to participate in the crowdfunding of science. Legal and political factors are also seen as antecedent because those influences are considered as known, prior to crowdfunding science. The role and influences of independent and university platforms is seen as both an antecedent and consequence since these platforms exert an influence before, during and after crowdfunding science. From the literature review no 'consequences' were found in relation to crowdfunding of science and therefore they remain a factor of investigation for this study. At the end of data collection and data analysis this inductively built framework will be completed deductively.

2.10 Research gap and research question

The literature review from previous chapter was used in order to explore potential antecedents and consequences when crowdfunding science. The antecedents of motivational and deterrent factors to crowdfund, from fund-seeker's and a crowd-donor's perspective were found. In addition, factors of influence for the amount that can be raised when crowdfunding science was also identified as an antecedent. Legal and political aspect were also acknowledged as antecedents, as well as the role and influence of university and independent platform for the crowdfunding of science.

The value of previous explored crowdfunding literature for this study must be seen with some incredulity. The reasons are that the academic crowdfunding literature is not based on the crowdfunding of science, and because of the specialized nature that crowdfunding of science is, in comparison to other crowdfunding types (Hui and Gerber, 2013), the literature must be seen with some skepticism. The literature review of public policies, science funding, innovation in science, scientific knowledge gap, grant application processes and science communication, could possibly give some support, in terms of antecedents and consequences when crowdfunding science. Because of the lack of academic research that exists on the crowdfunding of science, this study aims to close the research gap that exists on the topic, by conducting an inductive-deductive exploratory study with the following research question:

"What are the Antecedents and Consequences of crowd funding science?"

The first part of the research question aims to answer what the antecedents of crowdfunding science are. In this study, antecedents refer to factors of influence of the crowdfunding of science ecosystem. The second part of this research question aims to answer what the consequences are when crowdfunding of science is carried out.

3.0 Methods and data collection

This chapter describes the fundamental elements composing the research design used for this study which will lead to a result section. This section first describes the nature of the study followed by a description of the method of data collection and a description of the coding process used for data analysis.

3.1 Exploratory qualitative deductive - inductive research methodology

When choosing a particular methodological approach for a study, the purpose of the study needs to be taken in consideration, and by doing so, it became eminent to use an explorative qualitative inductive-deductive research approach with coding as a data analysis technique. Even though it is important to discuss different qualitative schools of thought in relation to their nature of philosophical, epistemological and ontological discourse, this becomes difficult. It is difficult, as the analytical coding technique used for data analysis in this study with regards to its ontological and epistemology terminology becomes a "little bit of this and a little bit of that" as stated by Ridder et al. (2014).

Nevertheless, this study has an exploratory research purpose because of the new phenomena that is the crowdfunding of science where scarce academic literature exists on the topic. According to Robson (2002), exploratory studies are valuable when a study aims to find out what is happening, to seek new insights, to ask questions and to asses a phenomenon in new lights. In addition, it is especially useful when a problem needs clarification and further understanding (Saunders et al. 2011). The process is further flexible and adaptable to changes as results of new insights gained from the collection of data. Adaptability is especially important for this study, since the study uses a technique called 'theoretical sampling' as methods of data collection and 'constant comparison' as a method in the coding process. Even though, the exploratory process is considered to be flexible to changes, it is not absent of direction, but rather, an exploratory study starts with an initially broad research question which is progressively narrowed down as the study progresses (Adams and Schvaneveldt 1991).

Furthermore, on a general level there are two types of broad research methods used when conducting social science which are either qualitatively or quantitative. Quantitative data methods are best suited for studies where the research area is predisposed for quantification or if one wants to test a set of already made variables or untested theories (Thomson, 2004). In comparison, qualitative inquiry is a method that tends to be more exploratory in its design and more concerned with experience and discovery and finding relations opposed to testing variables (Thomson, 2004; Corbin and Strauss, 1990). Qualitative data further offers the

understanding of real life situations since its focus is on naturally occurring and ordinary events in a natural setting. The method also gives the possibility to gain knowledge of underlying and non-obvious issues, build new theories, asses' causation, and find patterns of relationships between coding variables. (Ridder et al. 2014). Therefore, for this study the qualitative research method became the method of choice especially, because it is more exploratory, it offers an understating of non-obvious issues, build theories and asses relationships between different coded variables.

The inductive and the deductive research approaches are two different ways of drawing conclusions when conducting a study. An inductive research approach can be defined as "a method which involves the collection of data and developing new theories based on the results obtained from the data analysis (Saunders et al. 2011). On the other hand, the deductive research approach is used when one develops theories and hypotheses and designs a research strategy to test these hypotheses (Saunders et al. 2011). The same author offers a number of guidelines which can be used when conducting a scientific study. If there is a lot of literature covering a topic from which a conceptual or theoretical framework can be drawn, then the deductive framework is suitable to use as a research approach for a study. In contrast when a research topic is new and little information or literature can be found on the subject, then the inductive method is more suitable.

The above mentioned explanation given by Saunders et al. (2011), gave the author of this study a number of different dilemmas. First, there is a waste amount of literature on crowdfunding but no specific literature on the crowdfunding of science. Whether or not there were any resemblances or differences between the two concepts prior to the study was unknown, and therefore the literature became hypothetical and anecdotal. In addition, since the topic of this study required an exploratory approach where an inductive reasoning is required, it become problematic to decide if an inductive or deductive research approach should be used for this study. Neither the inductive, nor the deductive research approach seemed to be appropriate for the purpose of the study. Because of these encountered dilemmas, I decided to use an inductive-deductive research technique mixing both of these approaches together.

The framework of core categories (figure 2, page 24) found in previous chapter was created inductively from hypothetical antecedents and consequences derived from the literature review. This core category inductive framework of antecedents served as a departure for an interview guide and a beginning of a deductive study. Saunders et al. (2011) state the following in regards: "Not only it is perfectly possible to combine the deductive and inductive method within the same scientific research study, it is even recommended and advantageous to do so". Shown below is how the deductive-inductive reasoning was applied in practice for this study.

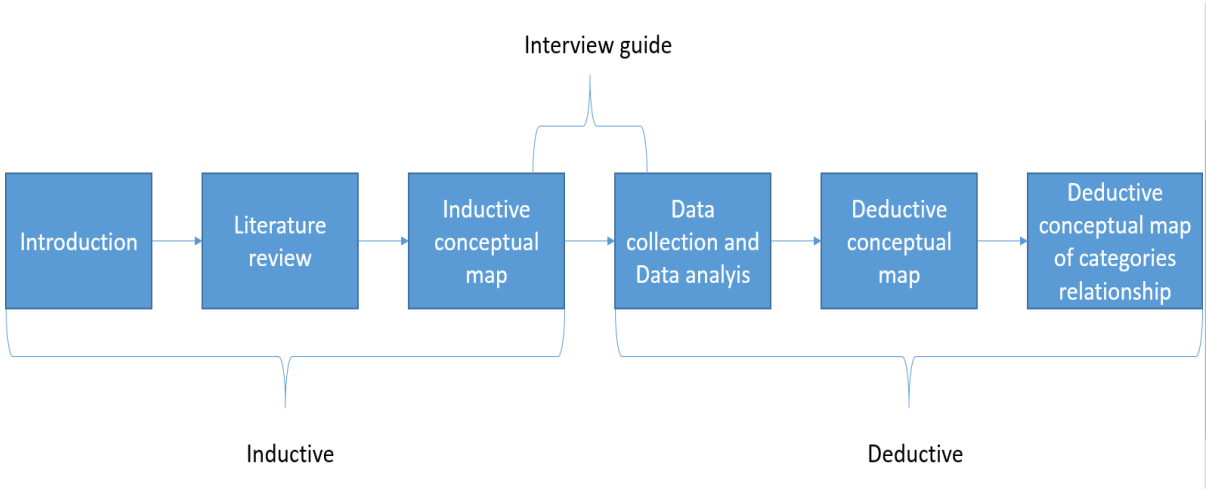


Figure 3. Inductive-deductive research approach

3.2 Data collections

Data collection methods are often categorized as either probabilistic or non-probabilistic. Probabilistic sampling methods need to make estimate of the representatives of the sample size prior to data collection. The non-probabilistic sampling method used in this study offers more interpretation and judgement of the author conducting the study. For non-probability sampling the selection of elements and sample size is not made for the aim of being statistically representative, but rather a number of alternative techniques are used to assure the study's credibility (Saunders et al. 2011). The two techniques used in this study, as underlying strategy for data collection, are triangulation and theoretical sampling.

3.2.1 Triangulation

Triangulation of data "combines data drawn from different sources at different times, in different places or from different people" (Flick et al., 2004). Data in triangulation does not only have to consist of interview transcripts, therefore other sources can be used as well, such as: fields note of observation, journal entries, texts, electronic communication, newspapers etc. (Hancock et al. 2007). The triangulation method is useful since, by using different sample groups of people, it compensates for any one-sided, intrinsic biases or distortion that might occur, if a study only made use of one sample group (Flick et al., 2004; Patton, 1999). For example, asking a group of university students if they believe that university is good for their careers without asking politicians and non-university students, would result in results with bias.

Following the definition of Flick et al. (2004), the collection of primary and secondary data took place at different points in time, ranging from months apart. From the same definition, primary and secondary data was collected from different people or in this case, different sample groups. These different sample groups of this study are: researchers (fund-seekers) with experience of crowdfunding, crowd-donors who have participated in the crowdfunding in science, science experts with knowledge of crowdfunding of science, researchers with no experience of crowdfunding but with knowledge of the concepts and universities and independent crowdfunding of science platforms. However, for this study no cross data validity checks are performed, which is often the case with regards to the use of triangulation. In respect of the triangulation definition provided by Flick et al. (2004), different sources were also used for data collection. These sources constituted of secondary data of interviews made with participants of the different sample groups in newspapers, the popular press, journals as well as interview transcripts obtained from the collection of primary data.

3.2.2 Theoretical sampling

Theoretical sampling can be defined as "the purposeful selection of a sample according to the developing categories and emerging theory" (Cole, 1997). Theoretical sampling is used in order to build emerging theories and gain further understanding of the concept at hand, rather than achieving population representativeness (Sounders et al. 2015; Charmaz, 2006). In comparison to most types of research methods, where the number of sources needed to achieve representativeness are determined beforehand, in theoretical sampling the number of sources and what to sample is unknown from the beginning of the study (Glaser and Strauss, 1967; Glaser, 1992; Cole, 1997). On the same note theoretical sampling challenge the presumption of hypothesis testing, since new data collection is determined not by prior hypotheses but by interpretation of emerging theories deducted from the coding process (Suddaby 2006).

Another explanation is given by Charmaz (2006) stating "When you engage in theoretical sampling, researchers seek statements, events or cases that will illuminate the categories developed from the coding process". Therefore, after the data was collected and analysed, categories emerged as a result of the coding process and theoretical sampling helped to predict where and how to find more data to fill any missing gaps within those categories. When these missing gaps where found in different categories, they were completed afterwards by both primary and secondary sources of data, until the author was able to reach theoretical saturation or conceptual density within each of these categories (Strauss and Corbin, 1998; Glaser, 1992).

Theoretical saturation can be defined as follows "Saturation is achieved through staying in the field until no new evidence emerges which can inform or underpin the development of a theoretical point" (Goulding, 2002). In this case, theoretical saturation was achieved, when the core categories deducted from the coding process were saturated. However, because of the time limit of this study some core categories did not reach theoretical saturation, such as the

following core categories; ‘consequence of universities’ and ‘demographics of researchers and crowd-donors in platforms’. These categories did not reach theoretical saturation because no real conclusion could be made based on the amount of data that were collected for those core categories.

3.2.3 Primary data

The number of participants of primary data that were included in this study, can be seen in the table here below, with respect to the different sample groups, deducted from the triangulation method.

Theoretical group	Name	Date and time	Duration of interview	Number of page of transcripts	Number of VIVO codes
Researcher with no CF background	Uriël Schuurs	04 of April	29 min	4 pages	17
University CF platform (Groningen)	Tienke Koning	16 of Nov	50 min	8 pages	36
University CF platform (Deakin)	Lee Astheimer	19 of Nov	31 min	5 page	38
Crowdfunding researcher	Jan Maarten van Dijl	18 of Nov	47 min	9 pages	63
Crowdfunding researcher	Romana Schirhagle	19 of Nov	43 min	8 pages	53
Crowdfunding researcher	Aaron Seitz	27 of Nov	45 min	7 pages	75
Crowdfunding researcher	Robert Doebele	12 of Nov	13 min	3 pages	22
Crowdfunding researcher	Katleen Pryer	24 of Nov	32 min	6 pages	50
Crowdfunding researcher	Dan Jaffe	23 of Nov	15 min	3 pages	29
CFS Crowd-donor	Wythe Marschall	14 of April	21 min	4 pages	24
CFS Platform (Walacea)	Natalie Jonk	20 of Nov	50 min	7 pages	57
CFS Platform (Instrumentl)	Kathrine Corriveau	20 of Nov	20 min	3 pages	21
CFS Platform (Futsci)	Deppika Cassen	10 of Nov	40 min	8 pages	74
CFS Platform (Scienstarter)	Thorsten Witt	10 of Nov	21 min	4 pages	59
CFS Platform (Pozible)	Elliot Chapple	09 of Nov	18 min	3 pages	31
Total number of VIVO codes references of primary data Interviews 649					

Table 1. Primary data and sample groups

As a point of departure I started by approaching different platforms of science providers including Futsci.com, Pozible.com and Scienstarter.de. The interviewees were contacted directly on the Crowdfunding platforms. When contacted the respondents were asked if they wanted to participate in a crowdfunding research and if so, at what time and date they would be available, with the explanation that the interviews were to be held via Skype with the

possibility of anonymity. After the first interviews were conducted, I gained some understanding of what to expect from future interviews. The sample of researchers who have crowdfunded scientific projects were approached in the same manner as the platform provider sample group. These crowdfunded researchers were approached on the platform either via the platform "in mail mechanism" or by the respondent's private mail found on their campaign page. The crowd-donors on crowdfunding platforms did pose more challenges since many science crowdfunding platforms allow people to be registered an anonymous, except for the platform Experiment.com. Crowd-donors were therefore solely contacted on the platform Experiment.com directly through the platform's message system.

The sample of researchers without prior knowledge of crowdfunding were contacted by mail on different University websites. These researchers were thereafter asked if they wanted to participate in the crowdfunding initiative. Experts of science with knowledge of crowdfunding science were the sample group of participants which created the most difficulties due to the scarcity of people that exists for that sample group and that sample group was therefore complemented with secondary data. I conducted a total of 15 interviews on skype ranging from 15 minutes to 50 minutes in duration. Skype give the possibility of videos calls and whenever possible due to bandwidth, this feature was utilized. After the interviews were conducted, all transcripts where recorded and transcribed. The transcription was carried out within two days after the interviews and each interview was transcribed word by word.

Before the interviews took place, I developed an interview guide that can be found in Appendix (table 31, chapter 8.3, page 97). The word guide is a preferred definition to use in this study, since a guide is more flexible rather than a script than cannot be altered or changed as the study progresses. I used in this paper several narrative open ended questions followed by several probing questions. Probing questions provide interviewers with a "way to draw out more complete stories from subjects" (Berg et al. 2004). An example of an open ended question asked in this study is "What do you think influences the amount of funds that can be raised in crowdfunding?". A first probing follow-up question from the above open ended question could be "Do you think the skills of researchers influence the amount of funds that can be raised?". A third probing question of the first probing question could be "What kind of skills are the most important in order to be able to raise funds when crowdfunding science?" and so on. Probing questions made it possible to obtain more information about the categories being studied and this would not be the case with only several open ended questions following each other. Probing was beneficial since it offered the possibility to reframe or restate the interview questions, if the subject did not understand a particular question. Following the rules of theoretical sampling, if new hypothetical antecedents and consequences or potential new categories (open, axial, selective) were identified during an interview, further probing questions were asked on these new identified categories. Questions about these new categories were then further asked about, to other interviewees in order to become more confident about their meaning.

3.2.4 Secondary data

The secondary data was collected from newspapers, popular press, and others sources where interviews have been made with respondents on the topic of crowdfunding science. The collection of data was made in regard to the different sample groups developed during the triangulation phase. When going through the sources of secondary materials, where interviews have been conducted with people on the topic of crowdfunding science, I decided to code only what had been said directly by the interviewees (participants of the sample groups). These responses could be identified because they were either within inverted comma signs, and in certain cases the interviews made in the different sources, followed a strict 'question and answer'- structure that is often seen in interviews, hence it was easy to identify what had been said only by the respondents.

I decided to only code data where there was clear evidence that the words were from the interviewee and not distorted by the authors who wrote the article. The reason for just coding the original words of the interviewees is to prohibit the distortion of data and bias as the danger of using secondary data is that the data most likely has been collected for other intentions (Veal, 2006). By coding only the direct words of the respondents, I believe that the secondary data collected can be interpreted as not having been modified or tempered with in order to fit a certain context, hence adding more value to the overall coding process and the quality of this study. In table 2 are the respondents who have participated in various interviews of secondary sources, from which VIVO codes have been subtracted.

The University CFS platforms consist of; Deakin universities, University of Alabama at Birmingham and Georgia tech University. The Independent CFS platforms consist of; Hackuarium, iAMscientist, Scifundchallenge, Walacea, Experiment, Lifespan.io, WIB, RocketHub, Kickstarter and Thinkable. The Experts from the secondary data who have knowledge of crowdfunding science are; Science communication experts, adviser to the European commission, deputy director at the NIH (USA), director at UK campaign for science and engineering, CEO of the British science association, director at NIH (USA), economists, director for the EU innovation and technology policies, research policy experts, director of science outreach and policy at science Europe and knowledge exchange specialist and crowdfunding of science expert.

Theoretical Group	Name	VIVO codes	Name	VIVO codes
University CFS platform	Lee Astheimer	1	Randy Kinder	4
University CFS platform	Deb Verhoeven	4	Alison Mercer	12
Independent CFS platform	Luc Enry	4	Claude Sheer	4
Independent CFS platform	Jai Ranganathan	8	Nathalie Jonk	8
Independent CFS platform	Denny Luan	14	Cindy Wu	10
Independent CFS platform	Keith Komito	2	Jarret Byrnes	10
Independent CFS platform	Marcus Weisskopt	1	Ben McNeil	2
Independent CFS platform	Brian Meece	2	Yancey Strickler	3
Fund-seeker (Researcher)	Louisa Edgerly	5	Heather Kopsco	1
Fund-seeker (Researcher)	Adriano Henney	1	Preston Estep	3
Fund-seeker (Researcher)	Richard Monet	2	Rachel Aronson	5
Fund-seeker (Researcher)	Chris Grant	9	Kathleen Prayer	12
Fund-seeker (Researcher)	Dave Perlman	3	Ede Frecska	1
Fund-seeker (Researcher)	Ethan Parlstein	10	Gail Bishop	1
Fund-seeker (Researcher)	Andy Radford	2	Heather Kopsco	1
Fund-seeker (Researcher)	Ben McNeil	3	Mathias Pierche	7
Fund-seeker (Researcher)	Pia Sen	4	Dan Jaffe	2
Fund-seeker (Researcher)	Thomas Johansen	1	David Eagleman	3
Fund-seeker (Researcher)	Jonathan Thon	8	Lauren Kuehne	2
Fund-seeker (Researcher)	Herbert Sauro	1	Cindy Iorns	3
Science expert	Alice Bell	1	Didier Schmitt	1
Science expert	David Eaton	1	Sally Rockey	1
Science expert	Sarah Main	1	Imrhan Khan	2
Science expert	Elias Zerhouni	5	David Keizer	5
Science expert	Nick Dragojlovic	24	Alain Rallet	3
Science expert	Steven Wooding	4	Merle Jacob	2
Science expert	Jeanne Garbarino	2	Stephan Kuster	1
Science expert	Mark Reed	1	Joshua Graff Zivin	1
Researchers with no prior CFS experience	Jennifer Calkins	1	Johan Bollen	2
Total number of VIVO coded references of secondary data Interviews				
236				

Table 2. Secondary data and sample groups

3.3 Data analysis

In qualitative research, coding is a way of developing and refining interpretations of the data collected (Charmaz, 2006; Saldana, 2009). The coding process consists of a series of nonlinear steps that eventually aim to the construction of a beginning of theory or theoretical explanation for the phenomenon of interest that is studied by the researcher (Strauss and Corbin, 1998). Qualitative coding analysis is time consuming and intensive where the process consists of inductive reasoning, thinking and theocratizing (Sounders et al. 2011, (Taylor et al. 2015). It is further important to notice that coding is a process of constant comparison, a reasoning process in which the researchers of a study is in constant interaction with the data. This interaction with data results in an ongoing process, in order to search for patterns, relationships and differences,

what the similarities are and what can be the explanations of these difference and similarities within the data (Patton, 1999).

In order to analyze the collected data from the secondary and primary data, I used an analytical qualitative software called 'NVIVO'. The software makes it possible to code texts from different sources. Codes or coding can be explained as "labels that assigns symbolic meaning to the descriptive or inferential information compiled during a study" (Ridder et al. 2014). According to Saldana (2009) a data code in qualitative inquiry is "most often a word, a short phrase or a paragraph that symbolically assigns summative, salient, essence capturing and / or evocative attribute for a portion of language-based or visual data". Researchers in the literature disagree on the exact amount of data corpora in the total body of data that should be coded, where some authors believe that every detail is important while other believes that only the most important part of the corpus should be coded (Saldana, 2009). I decided to first code paragraphs which were later reduced into smaller coded sentences.

There is a waste amount of different ways of coding data depending of different researchers in the literature. These coding techniques range from open coding, axial coding, selective coding developed by Corbin and Strauss (1990), substantive coding, theoretical coding developed by Glaser, (1978, 1992), initial coding, focused coding, theoretical coding developed by Charmaz (2006). Data reduction, data display, data drawing and verifying conclusion developed by Ridder et al. (2014) and pre-coding, first cycle coding, second cycle coding, post coding developed by Saldana (2009). In this study the author used a mixed method of Saldana (2009) and Corbin and Strauss (1990). It is important to mention that all of these different coding techniques have the same purpose, to find relationships, patterns, themes and to build theories (Saldana, 2009). During the coding process each new collected code was compared with another code as well as the one already being used in order to form categories. A core category can be explained as a holder which incorporates one or several codes that appears to be related to one another indicating an idea that assumes general importance to the research question.

3.3.1 Precoding

As a point of departure I first performed precoding of the secondary and primary data. Precoding is referred as 'circling, highlighting, bolding, underlining quotes or passage from the passage of the data'. These passages are of importance since these pieces of information can serve as key evidence to support proposition, assertion and the theory found in the last stage of the coding process (Saldana, 2009). For this purpose, VIVO code was used which is also referred to as 'literal' or 'verbatim' coding. VIVO coding is one of the most well-known qualitative coding methods and VIVO coding helps researchers in their study since VIVO codes uses the participants own speech, hence providing rich information, to build categories, themes and concepts development (Strauss, 1987; Saldana 2009). VIVO codes become

especially important for this study since they will make it possible to find relationships between different open nodes, axial categories and core categories.

3.3.1 Open coding (open nodes)

In the open coding process, the VIVO codes were further analysed in order to find similar phrases, words or meanings that could point toward relationships between variables. Some VIVO codes, with a similar meaning, assertion or proposition were coded together as open nodes in NVIVO. For example, if nine respondents expressed that they believed that "crowdfunding is good for the advancement of science", then these nine VIVO codes from these nine different respondents who believe in this statement, were coded together to form the open node "crowdfunding is good for the advancement of science". The VIVO codes where kept intact within each open node since they provide further vivid phrases of the respondents own speech, description and meaning, as well as showing to which sample groups the VIVO codes belong.

If a negative view, belonging to the same open node was noticed in the coding process, a new open node was created reflecting that same negative view. Taking the example from above, then the same negative node becomes "crowdfunding is not good for science". Looking for negative cases is important, since it offers an opportunity to enhance the quality and the credibility of qualitative research (Patton, 1999). If a VIVO code did not fit a specific open node, a new open node was created in order to express the respondent's views. In addition, one VIVO code could have had overlapping information where one VIVO code had to be categorized as an open node twice. For example, if one respondent explained "In order to crowdfund science you need to be good at science communication but I think that creates a circumstance in which many researchers do not want to crowdfund science". In this case "need to be good at science communication" was coded under the axial category of: "skills needed by researchers" as well as "deterrent of researchers to crowdfund".

The building of frequency tables provided in chapter 8.2 in appendix became important in order to assess the strength of each node in relation to how many of the respondents believe a node to be true. The strength scale in this study is measured in the following way: if 8 or more respondents believe an open node to be true it represents 'very strong' evidence; 5-7 represent 'strong' evidence; 3-4 represent 'moderate evidence' and 1-2 represent 'weak evidence'. Even though do some researchers find that quantifying qualitative data is not a good idea (Patton, 1999), for this study frequency tables offer some benefits. Since some core categories were able to reach theoretical saturation while others did not, it became important to show these strengths in order to assess validity and reliability of the data as well as an indication for future research.

3.3.2 Axial coding, (axial categories)

Axial coding was used as a way of grouping summaries from the open coding process into a smaller number of categories or construct. Axial coding was used furthermore, as a way of rearranging the fragmented data into a whole new structure based on a certain hierarchy during the open coding process (Saunders et al. 2015). At this stage of the coding process I was especially interested in looking for relationships between the categories of data that had developed from the open coding phase as well as starting to build theories by looking for pattern relationships and conceptualizing the data (Saunders et al. 2015; Miles and Huberman, 1994). In order to do so, I used analytical memo which is an integrated part of the NVIVO software, in which I wrote down possible relations between variables (categories) as well as associations and notions for theory building, which were later used for building the concept map of relationships (figure 5 page 39). The NVIVO software also has an inbuilt mechanism where relationships could be added to categories, where these relationships could then be subtracted for future use.

3.3.3 Selective coding (Core categories)

Selective coding is the last stage of the coding process, where core categories have emerged in the data as a result of the previous steps of pre-coding, open coding and axial coding. 'Core categories' is a broad category incorporating several codes that appear to be related to one another and which indicate an idea that is interesting concerning the research question (Saunders et al., 2015). In terms of categories obtained from the coding process in a research study, a rule of thumb is to achieve fifteen to twenty categories (axial categories) divided into five to seven major concepts or core categories (Lichtman, 2012), while Creswell (2012) believes that twenty-five to thirty categories (axial categories) divided into five to six themes (core categories) is standard. Some 'core categories' were already developed in previous chapters, as seen in the inductive conceptual map (figure 2, page 24), and therefore finding these core categories became less difficult. However, for the consequences of crowdfunding science no core categories have been developed inductively from the literature review and these core categories have to emerge deductively from the coding process.

3.3.4 Relation between categories and theory building

The last part of the data analysis of this study consists of a conceptual map, showing the relationship between the categories developed from the coding process. Only the open nodes who had 'moderate evidence', 'high evidence' and 'very high evidence' were included in the concept map. Therefore, weak evidence where one or two respondents believed an open node

to be true, were excluded from the concept map. In addition, the concept map will only show the 'core categories' who reached theoretical saturation, hence 'consequences for universities' and 'demographics of the crowd-donors and fund-seekers' will be excluded from the concept map. The relationships between different categories are shown with an arrow indicating: "leads to"; "is part of" (association), "shows similarity" and "factor of influence to". The reasons, why the relationships between different categories exist, will further be explained in the results section.

3.4. Inductive deductive framework

From previous inductive framework (figure 2, page 24) 'legal and political factors related to CFS' were found as an antecedent. However, from the inductive-deductive framework seen here below (figure 6, page 38) obtained from the coding process, no real data related to 'legal and political factors' were found. Instead, 'intellectual property rights and theft related to CFS' was found as an antecedent when crowdfunding science. This core category was further moved into the core category 'roles and influence of independent and university platforms for CFS' because the platforms exert an influence on such property rights and thefts. One new antecedent was found from the coding process namely 'demographic of researchers and crowd-donors in CFS'. In addition, a number of new core categories (selective coding) have been found deductively from the coding process.

The new core categories found are 'impact and relevance of CFS projects', 'consequences for researchers', 'consequences for crowd-donors', 'consequence for universities', 'consequences for the relationship between the science community and the public' and 'consequence for science funding and public policies'. The consequences of crowdfunding science have been divided into consequences internal to the crowdfunding ecosystem and consequences external to the ecosystem. The consequences that are external to the crowdfunding ecosystem are consequences that are the result of possible spill-over effects over time, from the antecedents and consequences being internal to the crowdfunding ecosystem. Spill over effects can be defined as "a secondary effect that follows from a primary effect, and may be far removed in time or place from the event that caused the primary effect" (businessdictionary.com)

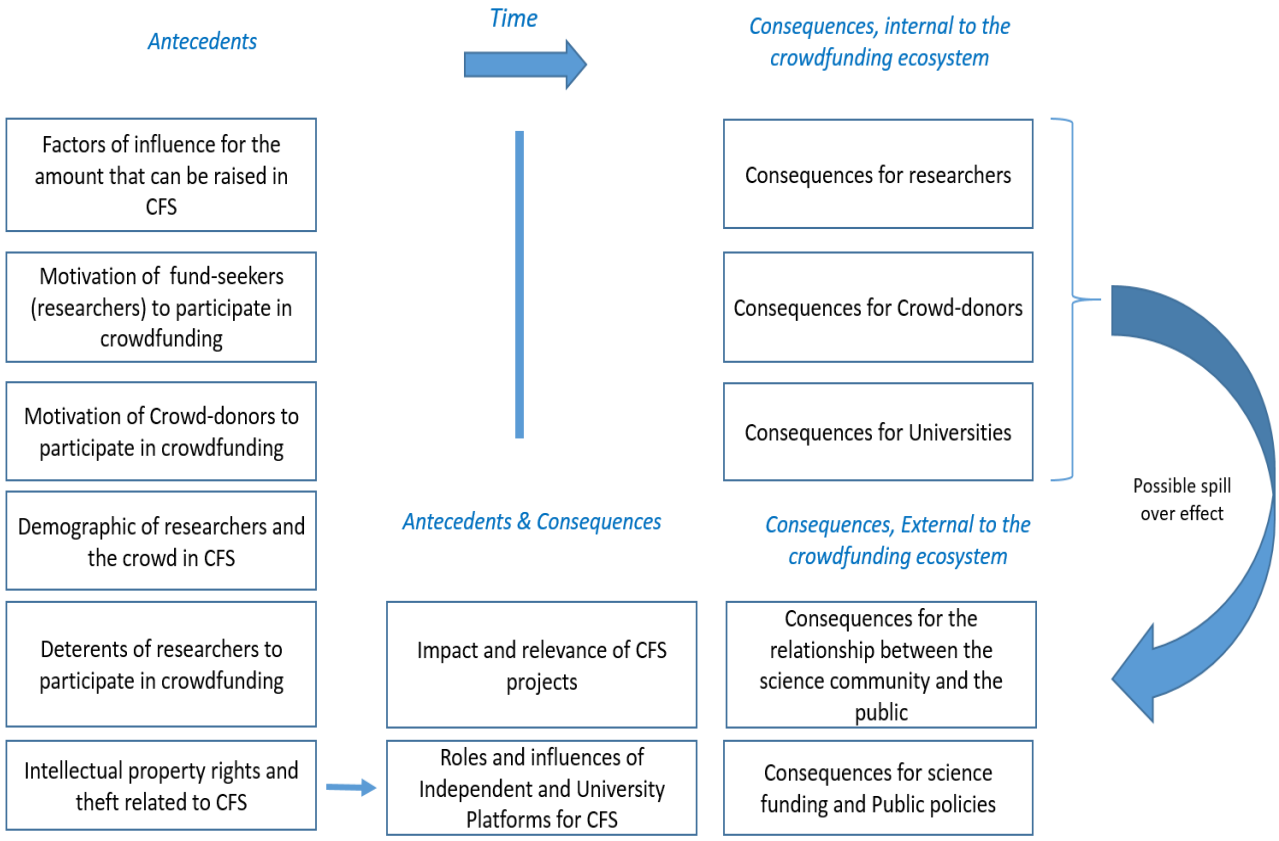


Figure 4. Inductive-deductive framework

3.5 Concept map of relationships

In Figure 5 (page 39) the concept map shows the relationships obtained from the coding process, between the open nodes, axial codes and selective codes (core categories). The concept map follows the same structure as the inductive-deductive framework (figure 4, page 38), from antecedents to the left and consequences to the right. In this concept map of relationship, only the relationships between categories that could be made plausible by linking these categories together with one or several VIVO codes are included. By only including the relationships that could be made plausible with one or serval VIVO codes in this study, I avoid the "no risk map". The "no risk map" is a concept map in which all the concepts are global and abstract and there are two-directional arrows everywhere which results in unfocused theories (Miles and Huberman, 1994). In addition, as mentioned before, only the core categories that reach theoretical saturation have been included. Furthermore, open nodes with weak results from the coding process are not part of this concept map. This concept map will be explained further in the results section.

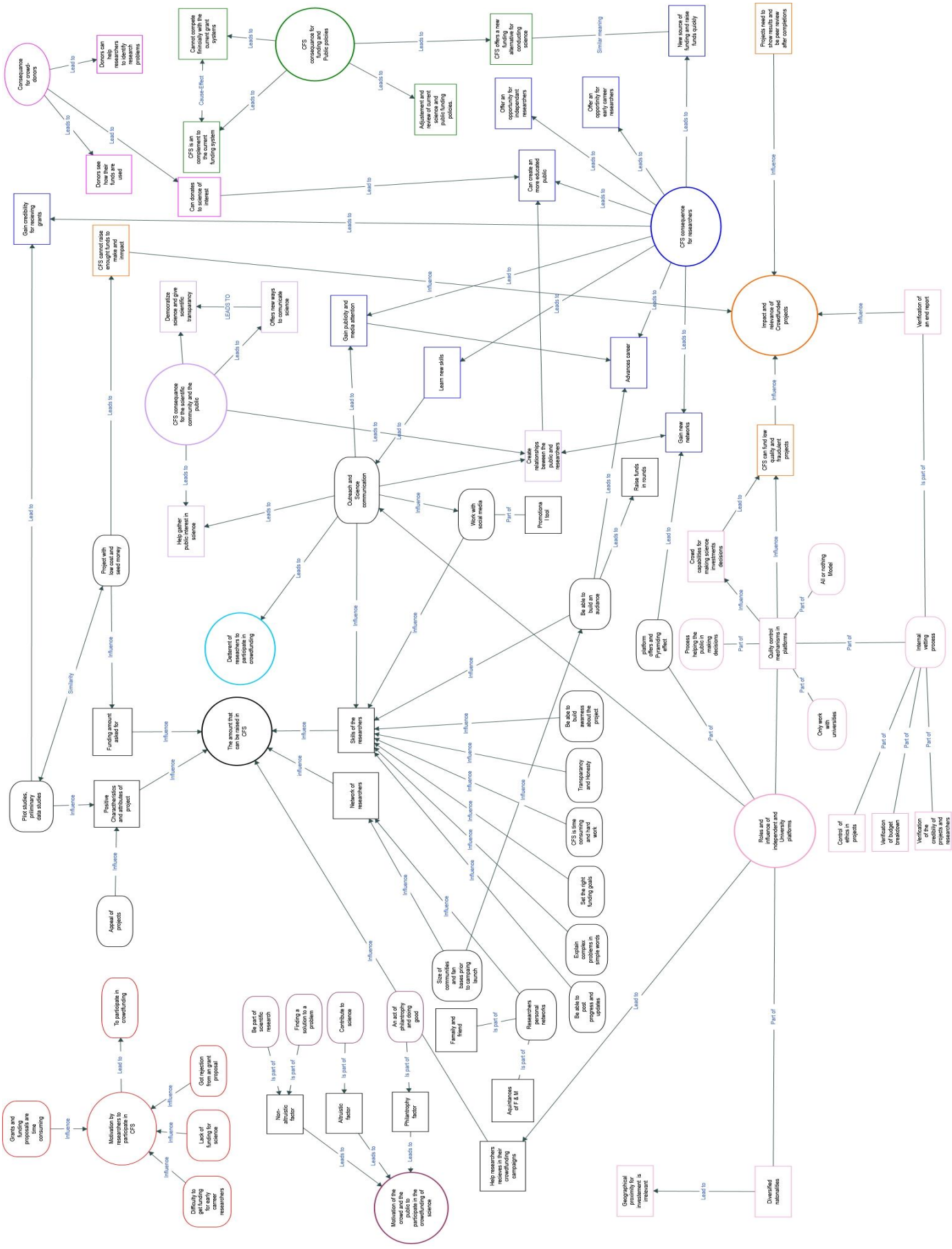


Figure 5. Concept map of relationships

4. 0 Findings and results

This section aims to present the findings from the coding process, developed from previous chapters of this study. This chapter will follow the same structure as figure 14, shown in chapter 8.1 of appendix (result of the coding process). In addition, the core categories and their relationships with each other as seen from figure 5 on page 39, will be explained in more detail.

First, each core category from the coding process will be presented with their equivalent subcategories of 'axials codes' and 'open node'. The open nodes will be presented with their equivalent strength scales (moderate evidence; strong evidence; very strong evidence). As stated in par. 3.3.1 the strength scale in this study is operationalized in the following way: if 8 or more respondents believe an open node to be true it represents "very strong" evidence; 5-7 represent "strong" evidence; 3-4 represent moderate evidence and 1-2 represent weak evidence. Even though the weaker results from the open node are not part of the concept map (figure 5), they will in this section be presented briefly in form of text. A more detailed overview of the coding process and the strength of each open node can be seen in figure 14 of chapter 8.1 and in the frequency tables in chapter 8.2 in appendix.

Secondly, if theoretical saturation was not achieved for a core category or an axial category, meaning that no conclusion could be drawn from the data, this will be indicated in the title section of that core category. The core category that did not achieve theoretical saturation will also be presented with a frequency table instead of a figure. Third, the reason why relationships exist between different categories, as see in figure 5, will be made plausible with one or several ViVO codes. Furthermore, in this study, "evidence (weak, moderate, strong)" represents the strength of each open node but "theoretical saturation" is related to a core category as a whole. Therefore, a core category could have open nodes with strong evidence within its core category, but the category can still be regarded as theoretically unsaturated.

4.1 Core category: Motivation and the deterrent of researchers to participate in CFS

As shown in figure 6, the motivational factors of researchers participating in crowdfunding of science, have an influence on the crowdfunding of science mechanism because of the cause and effect relationship, found between crowdfunding science and the current funding, grant and policy system. It is possible, based on the findings from the coding process, to assume that; if the current funding, grant and policy system changes in term of their funding policies for research, likewise will the degree of motivation of researchers wanting to crowdfund their research projects. The coding process further indicates that the motivational factors of researchers to crowdfund science are intrinsic and non-altruistic since the main goal of researchers to participate in crowdfunding is to raise funds for their research.

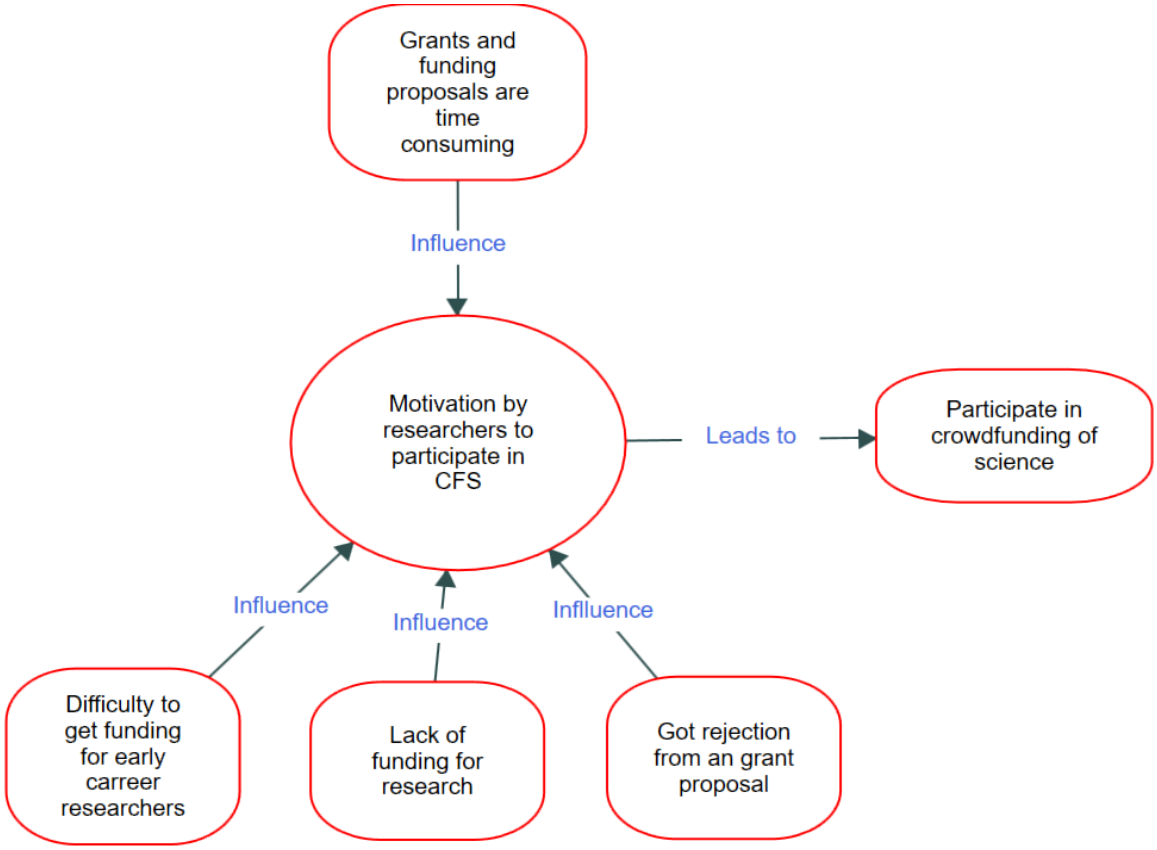


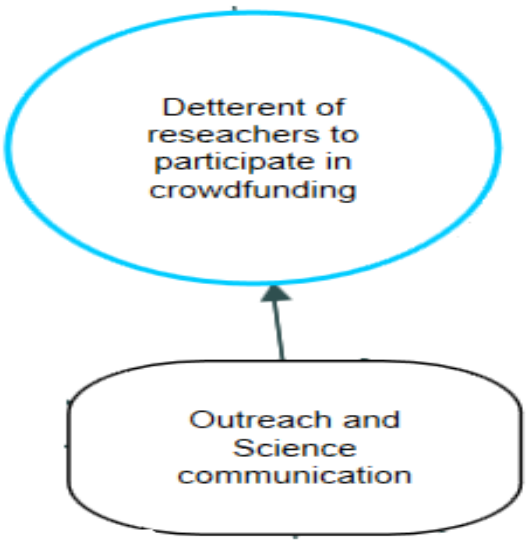
Figure 6. Motivation and deterrent of researchers in CFS

First there is strong evidence from the data for a lack of funding for scientific research, hence the motivation of researchers to turn to crowdfunding as a goal of raising funds for their scientific projects. Additionally, strong evidence indicates that researchers turn to crowdfunding because the application for scientific funding and grants via the traditional system is deemed as: time consuming, frustrating, cost money and it takes too long to get the money once a proposal gets accepted. The coding process also indicates that the motivation to turn to crowdfunding by researchers is because they got their grant or funding proposal declined. The researchers from the data, who failed at securing funding with the current grant and funding system had their applications rejected because either their projects did not have enough private data or the projects were too non-traditional or other science projects seemed more promising for the granting review panel.

Respondents of the data further believe that funding and grants for scientific research are especially difficult to get for young and new scientists without any proven track record, hence the reason why researchers of that demographic turn to crowdfunding. Experts from the data notify that only 10 to 20 percent of researchers as a whole get their funding and grant proposals approved. In the United States, young researchers receiving NIH grants have decreased from 18 percent to 3 percent since the early 1980. In addition, the overall age of researchers receiving federal grants and funding for conducting research is 43 years of age. Because of the average

age of researchers who receive funding for their scientific projects being 43 of age, it becomes possible to assume that the demographics of researchers who crowdfund are of younger age. Weaker results from the data also shows that researchers are motivated to turn to crowdfunding because: there is a desire to work with the public, open up the science process, to be more independent from scientific institutions and universities or to try something new.

4.1.1 Deterrent of the crowd to participate in CFS



This study indicates very strong evidence that the most important deterrent for researchers to participate in crowdfunding is due to outreach and science communication activities. Researchers have to make sure to efficiently communicate the purpose of their research to the crowd and constantly promote their scientific projects in order to attract crowd-donors to fund their crowdfunded projects. One platform provider explains that these communication and outreach skills, which are required by researchers to be successful at crowdfunding sciences, are skills that some researchers do not have prior to a crowdfunding campaign. Therefore, researchers who crowdfund research have to acquire these new skills during their campaigns. The platform providers and the researchers from the data, further explain that these outreach and communication practices that are needed to attract funds in crowdfunding are very different from the skills needed when applying for a traditional grant and funding proposal. One respondent indicates that researchers have the capabilities of practicing science communication and outreach or learn how to do so when crowdfunding, many scientists are not used to these practices, which in turn can deter researchers to participate in any crowdfunding activities. Weaker results from the data further indicate that deterrents of researchers to participate in crowdfunding are: a need to be extraverted; a need to break out of immediate circle; the need to be a salesman; go behind comfort zone and ask money from family and friends.

4.2 Core category; Motivation of crowd-donors to participate in CFS

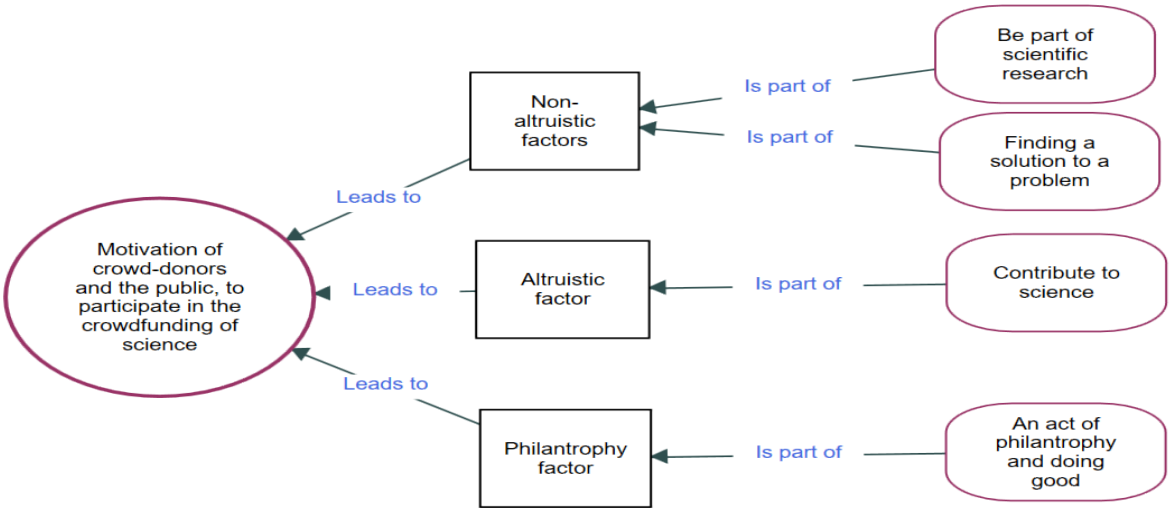


Figure 7. Motivation of crowd-donors to participate in CFS

The results from the coding process indicate that the motivational factors of crowd-donors and the public to participate in the crowdfunding of science are based on altruistic and non-altruist motivations as well as philanthropically reasons as can be seen in figure 7. An act of philanthropy and doing good and make contributions to science is seen as altruistic motivations while non-altruistic motivational factors identified from the coding process is: to be part of scientific research and finding a solution to a scientific problem.

Very strong evidence from the open coding process indicates that "Wanting to be part of scientific research" is a strong motivational factor which can be explained with the following VIVO codes: Crowd-donors are genuinely invested in scientific research; they have an interest in science; it is an opportunity to participate and feel part of the research they donate to. Further strong evidence from the data indicate that a "feeling of philanthropy and doing good" was a strong motivational factor of crowd-donors to participate in crowdfunding where the associated VIVO codes to the category were mostly related to words such as "wanting to help".

In addition, the motivational factors of wanting to "contribute to science" and "finding a solution to a problem" are factors of motivation by crowd-donors to participate in the crowdfunding of science. The category of motivation "finding a solution to a problem" could be explained by projects that have an expected positive influence on the crowd-donors who donate to these projects. One example of such expected influences by crowd-donors could be to find a cure in medical science, from which the crowd donors or someone in their entourage could benefit. Weaker evidence from the data demonstrates that the crowd and the public is interested in crowdfunding of science because they want: to be part of something bigger; having a say in scientific decisions; curiosity; be able to contribute to a better world; make a difference; put money to god use; receive a reward and help themselves or their family.

4.3 Core category; Factors that will influence for the amount of funds that can be raised in CFS

In this section the influences that have an impact on the amount of funding that a crowd-seeker (researcher) can raise with the crowdfunding of science mechanism will be presented. The coding process indicates that the amount of funding that crowd seekers (researchers) can raise from crowdfunding their research projects, is dependent on the axial categories of: 'discipline (characteristics) and attributes of projects', 'the funding amount asked for', 'the skills of researchers', 'the network of researchers' and the 'help received from the crowdfunding platform'.

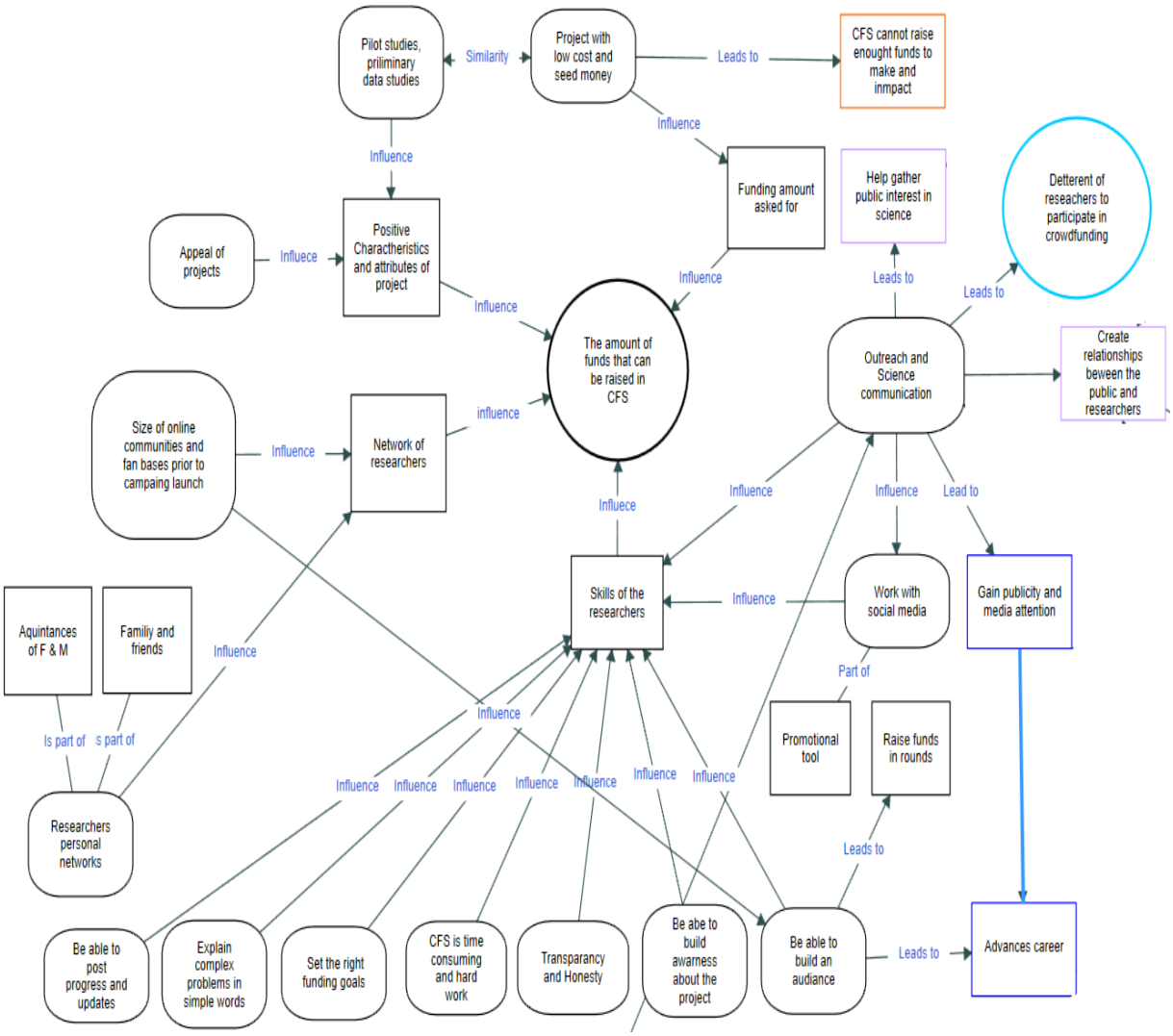


Figure 8. Factors of influence for the amount of funds that can be raised in CFS

4.3.1 Discipline and attributes of the projects that get crowdfunded in CFS

The open coding process shows very strong evidence for the importance of appeal in scientific projects. The data shows that the factor of appeal has a mediating role for whether or not a crowdfunding project reaches its funding goal as well as the amount of funding that can be raised via the crowdfunding mechanisms. Researchers, universities and independent platforms from the data agrees on the importance of appeal when crowdfunding research projects. Projects with appeal have a higher chance of getting funded in comparison to research projects with less appeal. Appeal in crowdfunded science projects is explained by the following VIVO codes: the scientific projects are spectacular; they have emotional value to the public and the crowd; they have importance to the crowd; they capture people interests; they have a strong connection to the public or the outcome of the project has value to the public.

There is further very strong evidence from the data for the type of projects that are most likely to get posted and crowdfunded on science platforms. The data indicates that research projects that are small and serve as seed projects or pilot studies have a higher chance of getting funded via the crowdfunding of science mechanisms. One of the reasons why such projects are more likely to get crowdfunded, is because they require an amount of funding which is lower than a full research program, hence the relationship that exists between the category 'funding asked for: low cost project' and 'characteristics and attributes of CFS projects: pilot studies, preliminary data studies' because these two categories have a similarity of meaning as seen in figure 8.

The open coding process further indicate mixed and weak evidence for whether or not some attributes on science projects are more likely to get funded than other attributes via the crowdfunding mechanism. The attributes of projects that have been mentioned from the respondents of the data, as most likely to get crowdfunded can be categorized as: abstract projects; projects will local issue; project with social outcome; innovative projects; cool and funny projects; high risks projects and feel good projects. Research projects with these attributes may or may not have a higher chance of getting funded via the crowdfunding mechanism but the data is too weak to be able to draw any concrete conclusions. However, research projects having the attribute of being politically touchy and controversial has moderate evidence for being more likely to get funded via the crowdfunding mechanism.

The open coding process also shows evidence for the type of science disciplines that are most likely to get funded with the crowdfunding of science mechanism. These science disciplines are mentioned by the respondents of the data as being: interdisciplinary research; medical research; applied research; humanities and social science. However, here again the data is too weak to be able to draw any strong conclusions on whether or not a certain science discipline is more suited than another science discipline for getting funded with the crowdfunding of science mechanism. However, moderate evidence from the data indicates that fundamental and basic research is not well suited for crowdfunding. The reasons for fundamental and basic

research, not being suited for crowdfunding can be explained by the ViVO codes; it is not very well understood, not interesting and its relevance it not obvious to crowd-donors and the public.

4.3.2 Funding amount in the crowdfunding of science

As noted in previous chapter, there is evidence that crowdfunding is well suited for pilot studies, preliminary data studies and small research projects. In this chapter there is further strong evidence from the data, that low cost and seed research projects are characteristics of projects that are the most likely to get funded with the crowdfunding of science mechanism, hence the relation seen in previous chapter between the categories 'pilot studies, preliminary data studies' and 'low cost projects'. Respondents of the data further suggest that researchers who wish to start a crowdfunding campaign should start by asking the crowd for a small amount of money as one VIVO code from an independent platform provider says: "Success in a crowdfunding campaign is influenced by the amount of funding researchers ask for and we often say: the lower the project budget is, the more likely the campaign is to succeed".

According to the table below, generated from the data of this study, 15 752 dollars is the mean amount of money that can be raised with a crowdfunding campaign. However, the maximum and minimum amount of funding raised in the campaigns that was used to generate the table, as seen in the diagram below varies greatly. Because of this variance it becomes difficult to make correct assumptions and predictions on the average amount of funding on a numerical scale that can be raised in a crowdfunding of science campaign by solely taking into consideration the data obtained from the campaigns of this study.

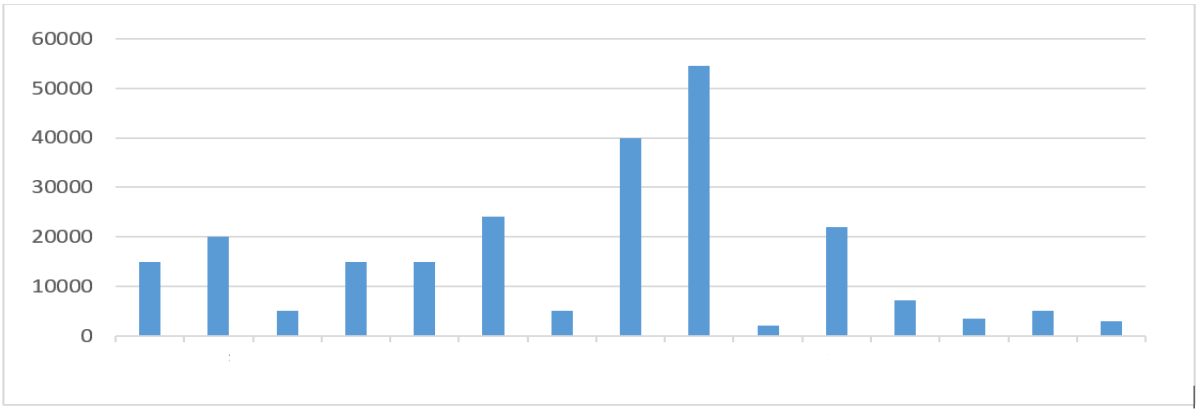


Table 3. Amount that can be raised in CFS

Data has been converted to Dollar

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Number of N	15	52600,00	2000,00	54600,00	15752,6000	14989,72110

Further information about the average amount of funding that can be raised in crowdfunding was given by the respondents in the data. Two independent platform providers explain that the average amount of funds that can be raised on their crowdfunding of science platform is 3029 and 2000 dollar respectively, where the average amount given per donor per campaign varies between 60 and 80 dollars. Another platform provider further argues that researchers who want to crowdfund science should not ask for more than 4300 dollars because it will be difficult to attain.

In crowdfunding of science there is weak evidence but accounted for, of a natural funding ceiling restricting researcher's campaigns to raise funds above a certain limit. This funding celling vary between the range of 25 000 dollars and 35 000 dollars and only some very successful crowdfunding campaigns have been able to reach above these limits in a single crowdfunding campaign. One independent platform provider explains that the reason for the existence of such celling originates from grant dependence, academic conservatism and ideological resistance by crowd-donors. Another alternative for getting more funding or raising funds above the funding ceiling is to divide the crowdfunding campaigns into milestones and raise funds with rounds. Five respondents believe that receiving a higher amount of funding for research projects in crowdfunding can be achieved by dividing the research project into several markers.

From the open coding process there was no indication that a shorter or longer crowdfunding campaign had any influence on the amount of funding that can be raised with a crowdfunding of science campaign. Two respondents explain that there is a lot of pledges early in the campaigns and at the end of the campaigns. During the middle of a crowdfunding campaign there is usually little or no activity. By having longer campaigns crowd-seekers are generally just stretching the middle period where there is not much activity and donation occurring. Therefore, a longer crowdfunding campaign will not result in higher amounts of funding in comparison to a campaign with shorter duration.

4.3.3 Skills and attributes of researchers

There is very strong evidence from the data that a crowdfunding campaign is time consuming and requires a lot of work. It therefore becomes important for fund-seekers who crowdfund research, to be able to devote time and effort into their crowdfunding campaigns. Indication of crowdfunding campaigns being time consuming and a hard work is associated with VIVO codes such as: time consuming and hard work; not for the faint of heart; an intensive process; crowdfunding science is like running a marathon and crowdfunding of science campaigns is a lot of efforts.

When crowdfunding science the skills and attributes of researchers who crowdfund research have an influence on the amount of funding than can be raised with the crowdfunding

mechanisms. Very strong evidence from the coding process indicates the high value of researchers being able to practice science communication and outreach when crowdfunding science. How well researchers are able to communicate with the public and the crowd before and during their crowdfunding campaigns is seen as an influential factor on how well researchers are able to sell a scientific idea and as a result be able to achieve or raise above their funding goal. Science communication and science outreach is explained with VIVO codes as being able to: engage the public; pitch a research project; talk about the crowdfunded project; engage with the public; excite the public; communicate via channels such as e-mail; inform the public as well as making sure that crowd-donors are able to follow the progress of the research projects and understand the benefits of the science projects. One VIVO code associate long-term scientific outreach as being: the only way to unlock significant dollar value out of the crowdfunding process.

There is further very strong evidence from the data, that social media is an important tool in crowdfunding, for practicing science communication and science outreach, as well as being an effective tool for promotional activities. Researcher's ability to effectively use social media during a crowdfunding of science campaign becomes an influential factor for the amount of funds researchers are able to raise for their crowdfunding of science campaigns. Because social media is an important tool for science communication, there is an associative relationship between the categories 'Skills of researchers: Science communication and outreach' and 'Skills of researchers: working with social media' as seen in figure 8. However, working with social media is also seen as an independent variable in this study, since crowd-seekers can excel at working with social media activities but being bad at other science communication activities. Examples of social media tools used in crowdfunding campaigns, as explained by the respondents of the data include; Facebook, twitter, Reddit, tweets, blogs and Reddit science. A platform provider further explains that social media tools help bring more people to visit researcher's campaign pages and as a result, these visits alter into donations, hence researchers are able to raise more funds for their projects. One researcher from the data explains that, the top-five visitor sources of their crowdfunding campaigns comes from referrals of social media pages such as Twitter, Reddit and Facebook.

Strong evidence from the coding process shows the importance of fund-seekers, being able to build an audience. The respondents of the data note such importance with the following VIVO codes: "The earlier researchers start to increase their networks the easier it will be for them to spread the word for their campaigns once they launch it" and "The success of a science crowdfunding campaign depends on researcher's ability to build an audience for their project before the campaign begins". Being able to build an audience is especially important if researchers want to raise funds for a project in rounds (several crowdfunding campaigns for the same project) and advance their careers, hence the relationship between the category 'Skills of researchers: being able to build an audience' which leads to 'raise funds in rounds'; 'Consequences for researchers: advance career' as seen in figure 8. A relationship between the three categories can be made with the following VIVO codes: "Audience building should

continue paying off in ever-greater amount, not only for a one-time campaign but throughout the course of researcher's careers" and "Scientists, should focus on building a fan base that is willing to support researchers in their longer-term research efforts". Scientists with a large audience could, according to one platform provider, "routinely raise tens of thousands of dollars annually to support their research". The open coding process further shows strong evidence that "the ability of fund-seekers to explain complex scientific problems into coherent and simple meaning that crowd-donors can understand" is an important skill when crowdfunding science. The importance of such a skill can be explained with the following VIVO codes: we were forced to explain our idea to the crowd in simple words, otherwise no money; you have to be able to explain yourself in simple words; we needed to keep it simple since people are not scientists; need skills to simplify problems; explain so people can understand; make clear and simple connections of your problem; provide anecdote so people understand your research.

Strong evidence further indicates the importance of researchers being able to regularly post updates of the progress of their crowdfunded projects. The public and crowd-donors are willing to donate a larger amount of funds, if the they feel connected to the researchers and the researcher's projects. One platform provider from the data associated a successful crowdfunding of science campaign, when researchers post 2-3 updates a day, while in an unsuccessful crowdfunding campaign, researchers would only post 2-3 update a month. Yet another platform provider suggests that researchers should keep the crowd informed on their research projects by posting updates every day. Strong evidence from the coding process further suggests, that the ability of fund-seekers to set the right funding goal for their campaigns, has an influence on the amount of funds that researchers can raise in a crowdfunding of science campaign. This ability becomes especially important with science platforms having an "all or nothing model" where the funds are given back to the crowd-donors, if researchers do not meet their campaigns funding goals. Setting the right funding amount has been associated with VIVO codes such as: researchers need to be realistic; researchers expect too much; hard to know what the correct funding goal is; need to make a fair estimate between not too little and not too much.

Lastly, moderate evidence from the coding process indicates that researchers need to be able to build awareness of their projects (convey why their projects are important). Researchers also need to be transparent on what they want to achieve with their scientific projects and the amount of funds that is needed to achieve these goals. If researchers can't fulfil their promised goals, there is the possibility that researchers will not be able to run other crowdfunding of science campaigns, because of a lack of trust in the researchers by the crowd-donors. According to one respondent of the data, social forces carry a lot of weight and such weight should be an incentive for researchers to be honest and transparent. Further weaker evidence from the open coding process suggests that other important skills to possess by researchers, when crowdfunding science are: effective use of rhetoric and presentation of the projects on their campaign page.

4.3.4 Network of researchers

Strong evidence from the coding process indicates that researcher's online communities and fan bases prior to the launch of a research campaign, will have an influence on the amount of funds that researchers are able to raise in their crowdfunding campaigns. If researchers already have dedicated online communities and fan bases prior to their crowdfunding campaigns, the marginal efforts to build these communities and fan bases during their crowdfunding campaigns, decreases over time. This suggests a relationship between the category of 'networks of researchers: size of communities and fan bases prior to campaign launch' with 'skills of researcher: being able to build an audience' as the later influence the amount of efforts that is needed to build a new audience during a campaign, as seen in figure 8. In addition, as explained by one researcher from the data, a committed fan-base can help demonstrate the societal value of researcher's projects, and find other potential crowd-donors, suggesting a snowball effect. This snowball effect can be further accentuated with the following VIVO code: once a researcher has built a fan-base, these fans tend to share what gets them excited with their families and friends.

Deducted from the coding process, further moderate evidence displays that the size and the quality of researchers personal networks and immediate circles also plays an influential role in the amount of funds that researchers are able to collect via the crowdfunding of science mechanism. Fund-seekers' personal network consists of two layers namely: immediate family, friend and colleagues, the second layer consists of the acquaintance of the first layer. Associated VIVO codes for this open category indicate: a network is a necessity; it's difficult without one; a requirement. Lastly weak evidence from the data indicates that how well the researcher's projects teams are made up and what it consists of, will influence the amount of funds that can be raised with the crowdfunding of science mechanism.

4.3.5 The amount of help received by the crowdfunding of science platforms

The last factor that has an influence on the amount of funds that can be raised with crowdfunding of science, is the amount of help researchers receive from the science platforms. One researcher explains that it is very important for platform providers to advise scientists on what is going to work and what is not going to work when crowdfunding science. Another researcher says that the help received by platforms to promote researcher's projects has an influence on whether or not campaigns will be successful. One independent science platform provider explains that, platforms should help researchers, by providing support and advise, on how to market researchers campaigns since they, often have limited knowledge in the marketing field. Another platform indicates their involvements in such practices with the following VIVO code: "We try to educate scientists on what to expect and what we see work

on crowdfunding campaigns, how to get the idea out there and what the best ways are, to market a scientific campaign". Based on the information give above, there is a relationship between the category 'Roles and influence of platforms: the amount of help received from the platform' and 'Core category: factor of influence for the amount of funds raised in CFS', since the amount of help received influence the amount that can be raised in CFS as seen in figure 8.

4.4 Core category: Role and influence of the crowdfunding of science platforms

In this section the core category 'Role and influence of the crowdfunding of science platform' will be introduced. From the axial coding process, the categories that have been identified as being part of this core category are: 'Crowd and public capabilities for making science investment decisions', 'intellectual property rights and theft in CFS' and 'Quality control in CFS platforms'. Deducted from the coding process, university and independent platform providers have an influential factor for the crowdfunding of science mechanism on three other core categories namely: 'Core category: factors of influence for the amount of funds that can be raised in CFS', as seen in previous chapter; 'Core category: impact and relevance of crowdfunded projects' as well as 'Core category: consequences for the relationship between the science community and the public' as seen in figure 5 (page 39).

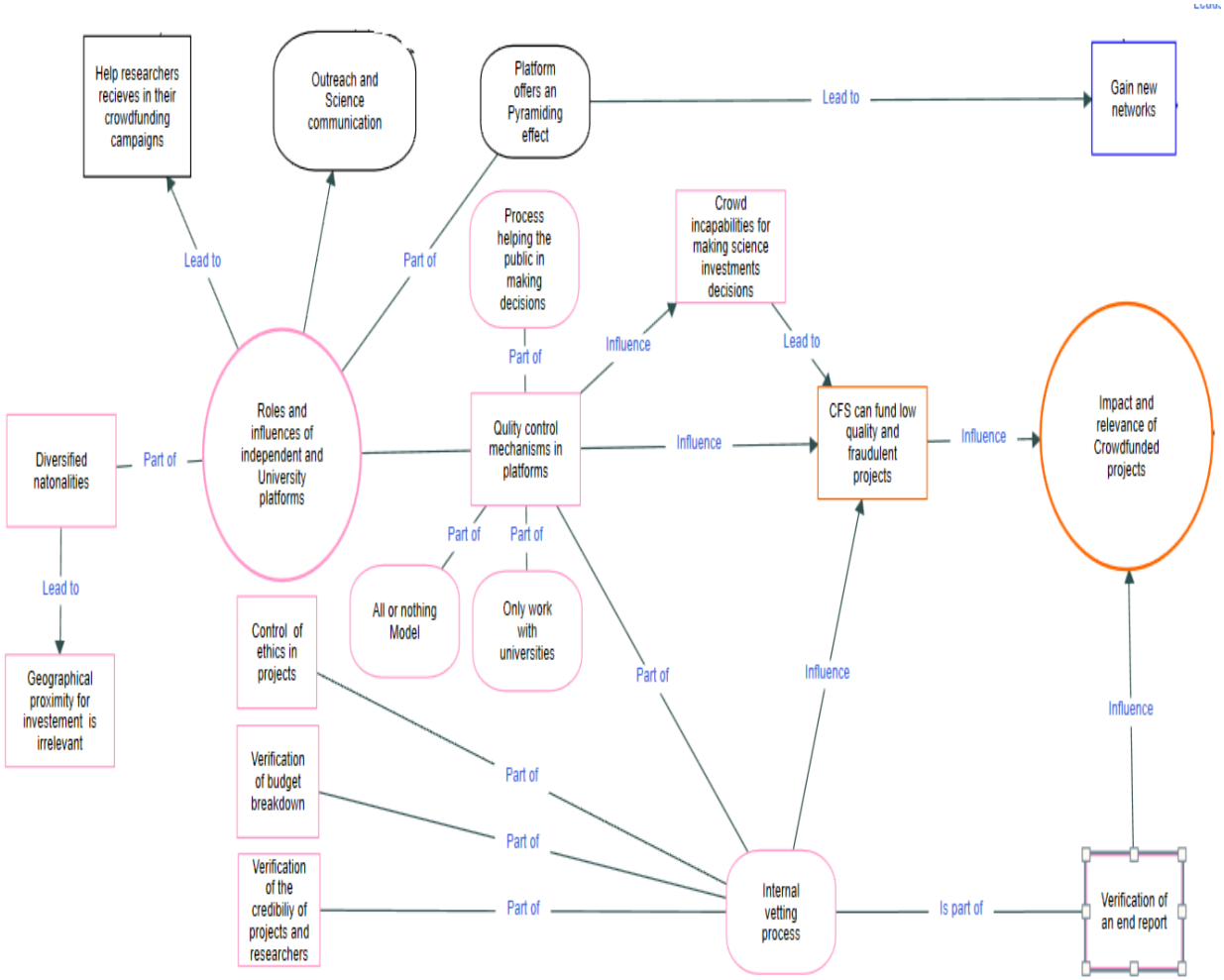


Figure 9. Roles and influence of science platforms in CFS

4.4.1 Crowd and public capabilities in making science investment decisions

Very strong evidence from the coding process indicates that the crowd and the public is to some extent scientific illiterate. Four CFS researchers (an independent platform provider; a university platform provider; a researcher with no prior experience with CFS and a CFS crowd-donor) believe that the crowd and the public are not capable of assessing the quality of scientific projects in crowdfunding. The data of this study suggests that the reasons are not only due to science illiteracy but that other factors have influence as well. Respondents from the data argue that researchers of crowdfunded science projects may make exaggerated claims about the value of their science projects, that the public is drawn too, rather than the crowd being drawn to projects that are feasible but have less perceived scientific impact. One researcher believes that it may be a concern that the average crowd-donors are not necessarily going to donate, based on the merit of the scientific projects in crowdfunding.

Another reason is that some scientific projects and science disciplines require an extensive and specialist knowledge that only a couple of researchers have, making it not only difficult for researchers to distinguish the quality of a project, but even more so for the public and the crowd. As suggested by the following VIVO code: "Sometime it is even hard for researchers to know whether or not a research project is good or bad and be able to assess the quality of it". Another reason why the crowd is not capable of distinguishing between the quality of different scientific projects, can be explained by the following VIVO code: "At the moment there is no mechanism in the crowdfunding of science that can help crowd-donors to distinguish and certify the quality of the crowdfunded science projects". Because of the reasons stated above there is an association between the categories 'Role and influence of crowdfunding of science platforms: crowd capabilities to make scientific investments decisions' which influence 'Impact and relevance of crowdfunded science projects: crowdfunding science can fund low quality projects or fraudulent projects' as seen in figure 9. The relationship between the two categories is made because the crowd incapability to distinguish the quality of crowdfunded projects could influence whether or not low quality projects get crowdfunded with the crowdfunding of science mechanism.

4.4.2 Quality control for the crowdfunding of science

Very strong evidence from the data shows that researchers, experts and crowdfunding platform providers argue, for the importance of having quality control mechanisms within crowdfunding of science platforms. Respondents from the data claim, that even though great things could come out of crowdfunding science, the mechanism can be ineffective, if crowdfunding campaigns are not properly overseen. One researcher explains, with the following VIVO code: "When we started crowdfunding our science project, we just wrote what we wanted to do and I posted my projects on the platform and that was it". Another researcher claims, that it is critical to have some sort of quality controls, that make it possible for the public to have an idea that the projects, they are funding are credible and legitimate.

In addition, the results from the coding process indicates that, researchers prefer to post their scientific projects on platforms, where such quality control mechanism exist, as these platforms have the perceived value by researchers to be the "ones who are serious about supporting science". Therefore, this axial category 'Role and influence of crowdfunding of science platforms: Quality controls mechanism' has a relationship to; 'Impact and relevance of crowdfunded projects: crowdfunding of science can fund low quality and fraudulent projects' as seen in figure 9. The relationship exists between the two categories since the crowdfunding platforms influence via their quality mechanisms, the quality of the science projects that get posted on these science platforms, hence influencing the impact and relevance of crowdfunded projects. The relationship between these two categories can be further explained with the following VIVO codes from two independent platform providers: "I do believe that there are

bad science projects and good scientific projects in crowdfunding and I don't believe that bad scientific projects should get funded with the crowdfunding mechanism" and "It's up to the crowdfunding platforms to make sure that the science projects that are posted for donations are of high quality".

Three non-mutually exclusive quality mechanisms within crowdfunding platforms are found from this study. These three mechanisms are: internal vetting process within the science platforms; only accept projects from university-researchers and implementing an all or nothing model. Four independent science platforms and one science expert argue that, in order to certify the quality of science projects, independent platform providers should only accept scientific projects from researchers working at universities, as these projects would be pre-vetted at these institutions, before being accepted and posted on the crowdfunding of science platforms.

Strong evidence from study further shows that having "an internal vetting process" on the science platforms is seen as a strong mechanism to ensure quality. The internal vetting process can be explained as a review process of the researcher and the project that the researcher is crowdfunding. Tools identified from the coding process as being part of the vetting process consist of: verifying the identity of the researchers, verify that researchers produce an end report, verify the credibility and the ethics of the projects; making sure that researchers have the skills needed to conduct the research; verification of the budget breakdowns of the scientific projects and making sure that the projects are answering a research question.

Weaker evidence from the data suggests that having an "all or nothing model" ensures the quality of the projects on science platforms. With an all or nothing model, scientists can only keep the funds raised if they achieve their pre-set funding goals. If researchers are not able to meet their pre-set funding goal, the money is returned to the crowd-donors. The argument for having such as model is because: If the funding goal is not meet, the scientists will not be able to complete the projects as there will not be enough resources available to do so. Further weak evidence from the data suggests different tools for helping crowd - donors in their investments decisions. Such tools could be a ranking system or project certifications within the crowdfunding platform as well as an internal forum on the platforms where crowd-donors can discuss different proposals between each other. One platform provider from this study has developed such forum called "geek launch" where crowd-donors can discuss different science pitches.

4.4.3 Intellectual property right and theft in CFS

There is moderate evidence from the data confirming that scientific projects cannot be reproduced based on what researchers show and post on their crowdfunding campaigns and on crowdfunding of science platforms. One platform provider explains that standardized contracts

on intellectual property rights exists prior to launching a campaign, where these contracts give researchers the sole property of the materials that are posted on scientific platforms and what is produced thereafter. The same contract exists for crowd-donors, prohibiting them of any ownership of the scientist's research. In addition, from what is deducted from this study, crowdfunding of science is classified as a donation based crowdfunding model and in such models equity right to the crowd-donors does not exists which means, that ownership concerns in the crowdfunding of science are fairly non-existent.

4.5. Core category; Impact and relevance of CFS projects

In this core category, three axial categories have been identified from the coding process as having influence on the impact and relevance of crowdfunded research projects, namely: 'quality of projects', 'outcome of projects' and 'amount of funds raised in CFS'. As seen from previous chapter this core category has a relationship with the core category 'roles and influence of crowdfunding of science platforms'. This core category reached partial theoretical saturation since the axial categories of 'quality of projects' and 'amount of funds raised in CFS' did not have strong enough data to be able to draw any conclusion for these axial categories. However, the axial category of 'outcome of CFS projects' did reach theoretical saturation. In table 4 are the open node and the number of respondants believing each node to be true.

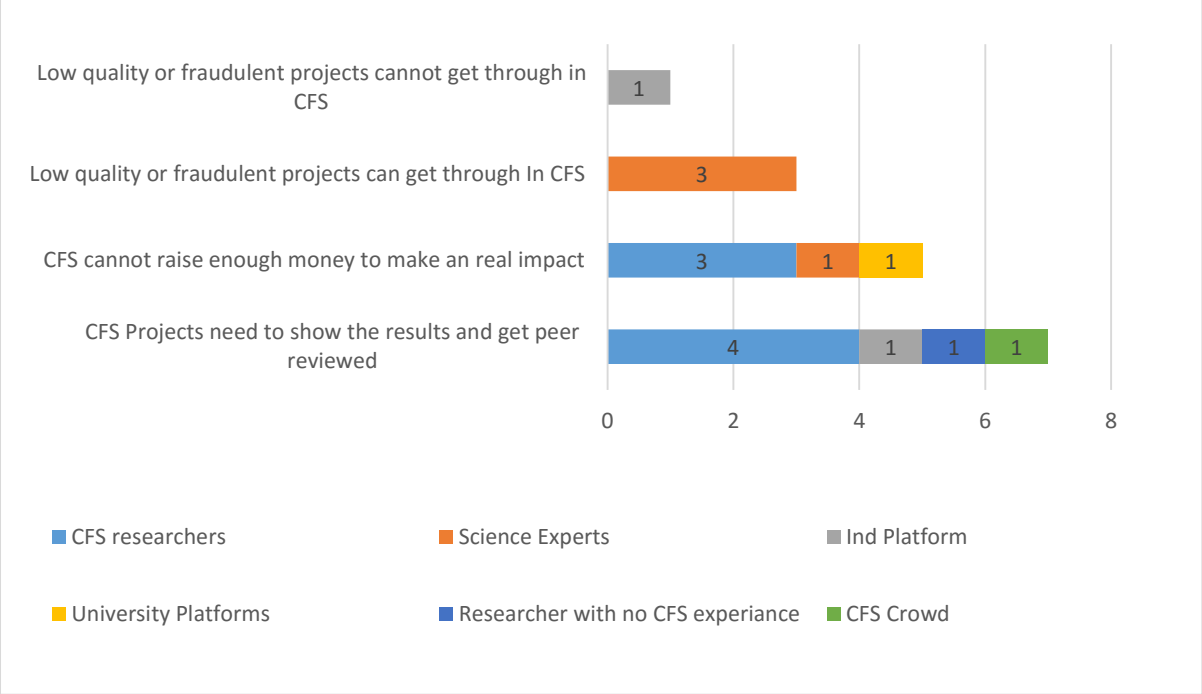


Table 4. Quality of projects in CFS

4.5.1 Amount of funds raised in CFS

This category has a relation with the axial category 'Funding amount asked for: project with low cost' as seen in figure 5 page 39. The relationship between the two categories can be made because both categories indicate similarity between each other. The coding process shows mixed evidence on whether or not the amount of funds that can be raised with crowdfunding of science is high enough in order for CFS to have an impact and to be of relevance. Three crowdfunding researchers, one science expert and one university platform argue that crowdfunding of science, at this moment cannot raise enough funds to make a real impact for scientific advancement. The latter statement can be further accentuated with the following VIVO code "If we move to a system where crowdfunding becomes a dominant source of funding for science, it means that science is in big trouble because we will not be making the same scientific breakthrough as we have made in the last decade". However, as seen from chapter 4.3.2 'Funding amount in the crowdfunding of science', there is the possibility to raise funds in rounds, hence increasing the amount of funds that researchers can raise for their research projects. In addition, as will presented in upcoming chapter (consequence for researchers) by crowdfunding science, researchers gain credibility for receiving grants and funding from the traditional science funding agencies, hence making the amount that can be raised in CFS less relevant. For the reasons stated above, it becomes difficult to draw any conclusions on whether or not the amount of funds that can be raised in crowdfunding of science has an impact or relevance for scientific achievement.

4.5.2 Quality and fraud in CFS projects

As noted in previous chapter 4.4 'roles and influence of crowdfunding platforms', the axial category 'quality and fraud of projects' has an influential relationship with two other axial categories namely: 'crowd's capabilities of making science investments decisions' and 'quality control mechanisms in CFS platforms'. There is a relationship between these categories because they exert an influence on each other. Mixed and weak evidence from the data suggests that low quality projects and fraudulent projects may be funded with the crowdfunding of science mechanism. Two science experts believe that crowdfunding of science will let low quality projects get funded through the platform mechanism and one science expert believe that crowdfunding can fund fraudulent science projects. The latter explanations can be clarified with the following VIVO codes: There is a real question about the quality of science in CFS; some crowdfunded sciences can be dangerous since releasing results to the public from science disciplines such as virology, with questionable methodology can have serious consequence for the public; "these new crowdfunding models encourage fraudulent research". However, one platform provider disagrees with the latter explanation, arguing that it is not in the best interest of researchers to post low quality or fraudulent projects on crowdfunding of science platforms,

since the main goal of researchers is to get peer reviewed and published. Because of the conflicting results obtained for this axial category, theoretical saturation is considered to be unreached.

4.5.3 Outcome of projects

Strong evidence from the data suggests that, in order for crowdfunded science projects to have an impact and to be of relevance, researchers much show the results obtained after completion of their crowdfunding campaign and most preferably a science article must be written and peer reviewed in the same way as non-crowdfunded research projects. Three respondents from the data argue that researchers who crowdfund scientific projects need to show the results of their crowdfunding campaigns and four respondents argue that crowdfunded research projects need to get peer reviewed in the same way as required by other researchers who do not crowdfund. The peer review is argued by the respondents, to make it possible to screen out and filter bad scientific projects: it is considered to be a stamp of approval for scientific projects and lastly, the peer review system acts as a mechanism that ensures that researcher's studies truly becomes part of the scientific literature.

4.6 Core category; Demographics of researcher and the crowd in CFS

In this section, the core category 'demographics of researchers and crowd-donors participating in crowdfunding of science' will be presented. The axial categories included in this core category consist of: 'age and gender of researchers and the crowd' and 'nationalities of researchers and the crowd'. It is important to notice that this core category only reached partial theoretical saturation, as there is not enough evidence from the data for the category 'age and gender of researchers and crowd donors' to draw any strong conclusions. The axial category 'nationality', did however reach theoretical saturation.

4.6.1 Age of researchers and crowd-donors

As seen in table 5 below, the data of the coding process, indicates mixed and weak evidence in relation to the age and gender of crowd-donors and fund-seekers, participating in the crowdfunding of science. From previous chapter 4.1, regarding the factors of motivation of researchers to participate in crowdfunding of science, there was the assumption that researchers who participate in crowdfunding are of younger age because of the difficulties for young

researchers to secure funding for their scientific projects from the traditional funding system. In regard to this axial category "age and gender of researcher and crowd donors", the data does not give any further support in this matter.

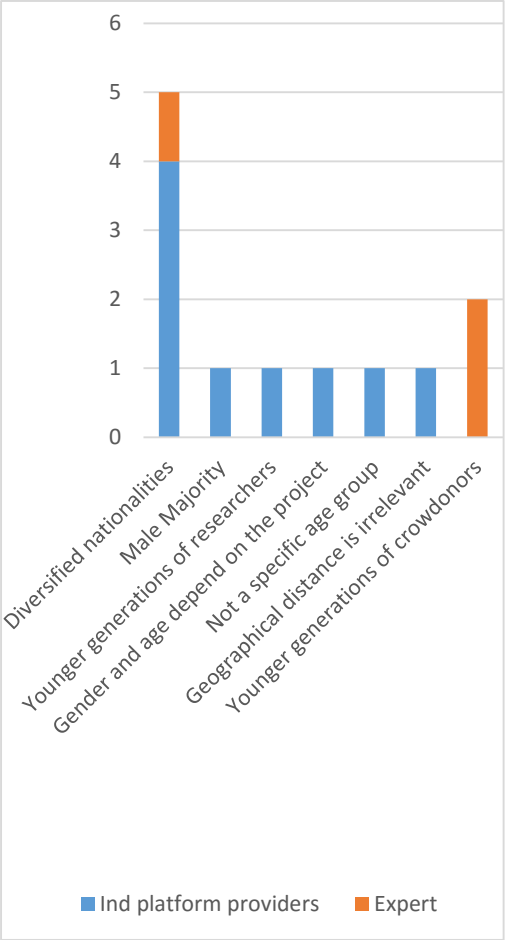


Table 5. Demographics of researchers and the crowd

The evidence from the data in this category is too weak in order to be able to accept or reject the latter assumption that researchers who crowdfund are of younger age, or draw any further conclusions in regard to the demographics of age and gender of **researchers** who crowdfund science. There is further weak evidence on the demographics **of crowd-donors**, participating in crowdfunding of science, in term of their age and gender.

From the data two respondents believe that crowd-donors are of younger age and one respondents believe that there is a male majority on the science platforms. One science expert from the data, after conducting a study on the topic of gender and age of crowd-donors, found that 80 percent of crowd-donors, who donated to one specific project on a science platform, were between the age of 25 to 44.

However, even though these results give some indication in terms of age for crowd-donors participating in the crowdfunding of science, one respondent believes that age is not dependent on neither the crowdfunding ecosystem, nor the different science platforms, but entirely dependent on the specific science project that is being crowdfunded. Therefore, from the coding process and the data of this study no strong conclusion can be drawn for this axial category and the category remains theoretical unsaturated.

4.6.2 Nationalities

The results from the coding process, indicate strong evidence that the crowd is composed of diversified nationalities, as one crowdfunding researcher explains that they had visitors from 65 different nationalities on their campaign page, while another researcher clarifies, they have received responses from all around the world. One independent platform provider further clarifies that they have over 50 nationalities registered on their U.K science platform. Because of the diversified nationalities that exist on crowdfunding platforms, there is evidence that

geographical barriers for investment decisions do not play a role for the crowdfunding of science, as explained with the following VIVO code: “There is not going to be that element where the crowd is going to want to back projects from their own countries and I think that constituent, is more related to other crowdfunding mechanisms, such as equity based crowdfunding model”.

4.7 Core category; Consequence, internal to the crowdfunding mechanism

In this chapter the core categories of ‘consequence, internal to the crowdfunding mechanism’, is introduced. Internal to the mechanism means, all the parties that are directly involved or participating in crowdfunding science. The axial coding categories, of this core category consist of: ‘consequence for researchers’; ‘consequence for universities’ and ‘consequence for the crowd’. For this core category theoretical saturation was reached for all axial categories, with the exception of the category ‘consequence for universities’.

4.7.1 Consequence for researchers

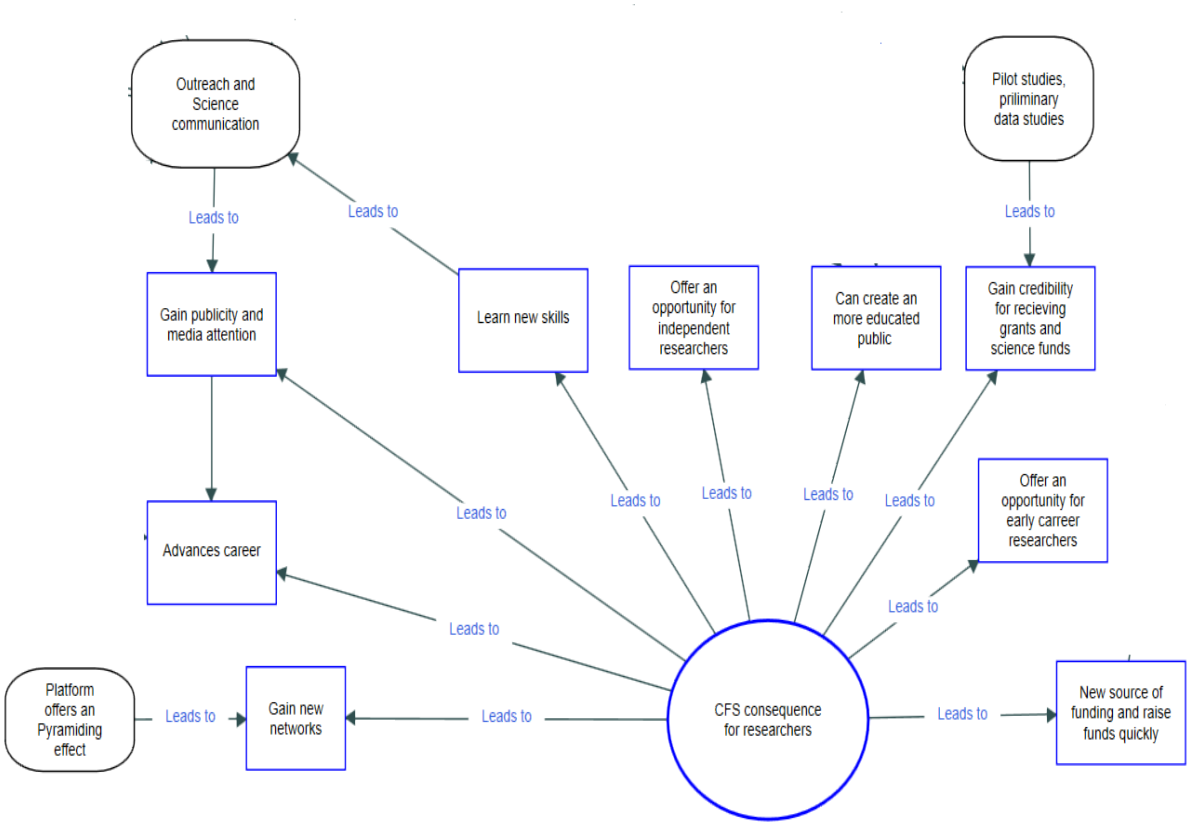


Figure 10. Consequences for researchers

From this study there is very strong evidence that crowdfunding offers a new source of funding for researchers to conduct research, as well as a mechanism that makes is possible to raise funds fast. Ten respondents believe that crowdfunding is a quick new source of funding as the following VIVO codes indicate: Raise cash-quickly; we got surprised how quick we got 2000 dollars; we needed to start the research immediately therefore CFS was a good idea; faster way to the funding in comparison to other mechanisms.

As already mentioned in chapter 4.1 on motivational factors of researchers to participate in crowdfunding, there was the assumption that young and early career scientists were especially motivated to turn to crowdfunding, and chapter 4.6 regarding the demographics of crowd-donors and researchers in platforms, did not give any more indication on the matter of demographics. In this core category, there is very strong evidence that crowdfunding of science is especially beneficial for young, PHD and early career scientists. Four crowdfunding researchers, four independent platform providers, four university platforms and two science experts indicate that the crowdfunding mechanism offers an opportunity for that young demographic of researchers. VIVO codes associated with this category can be explained by: "CFS will sponsor young researchers"; "CFS will benefit young researchers"; "We want to help young researchers fund their research" and "a new funding mechanism for PHD researchers". However, whether or not this actually indicates that younger researchers are more present on science platforms, or more likely to participate in the crowdfunding of science is still unknown.

There is further strong evidence from the data that researchers who crowdfund science gain credibility, for securing future funds and grants from the traditional funding and grant system such as NIH (USA) or the Royal academy of science (UK). Seven respondents believe that having had a crowdfunding of science campaign is perceived as a beneficial criterion to attract new grant funding from these institutions, which can be explained by the following VIVO codes: "After the success of the crowdfunding campaign we applied for a federal grant and because we had launched a successful crowdfunding campaign it gave us credibility in the eyes of the assessors"; " CFS gave us preliminary data to go after national science foundation such as NIH"; "Crowdfunding of science is an entry port to more funding". Deduced from the last VIVO codes, there is therefore a relationship between the category of 'seed projects and preliminary data' and the category 'gain credibility for receiving grants' since seed projects and primary data lead to receiving grant funding as seen in figure 5 (page 39).

Six respondents from the data further believe that there is a lot of positive publicity and media attention that can be gained when researchers crowdfund their scientific research, as the following VIVO codes suggest: "One thing that needs to be mentioned, is that the publicity gained from crowdfunding our science project, was at least as valuable as the money we got from the campaign". Researchers from the data saw their research project get picked up by the

Economist, USA Today and Scientific America, which according to the researchers of the project, gave them a tremendous beneficial push. One researcher further got the interests from a venture capitalist, who saw the benefits of the crowdfunded research project for future commercialisation. Because of the media attention some researchers of the data received, when crowdfunding their scientific projects, there is an assumptive relationship between the category 'Gain publicity and media attention' which leads to 'advance career' as noted in figure 10.

There is further moderate evidence, which indicates that crowdfunding science advances the careers of researchers who participate in it. Four respondents from the data argue that crowdfunding science helps researchers advance their career and one crowd-donor from the data thinks that crowdfunding practices will not affect the careers of researchers negatively. VIVO codes associated with the topic include: It is good for the career of researchers; tiny step for career advancement.

According to five respondents of the data, the crowdfunding of science mechanism also makes it possible for independent researchers to conduct research. Crowdfunding gives an opportunity for these independent researchers, who are not part of any scientific institution such as a university, to become part of science, as the following VIVO codes suggest: open the door for independent researchers; crowdfunding is good for independent researchers; as a platform provider, I also like to help independent researchers; CFS make it easier than ever, for individual scientists to launch their own campaigns.

Four respondents from the data further argue, that crowdfunding make it possible for researchers to learn new valuable skills. First the data shows that crowdfunding of science gives researchers the chance to gain new outreach and science communication skills. Therefore, there is a relationship between the category 'learn new skills' to the category 'outreach and science communication' as seen in figure 10. Secondly, researchers who crowdfund science learn, how to explain the value of their research to outside parties and be able to better translate their research to the crowd to and the public. The latter can be explained with the following VIVO code: "I think that researchers who are involved in crowdfunding, are able to present their research so much better than researchers who never had a crowdfunding of science campaign".

There is further moderate evidence that researchers who crowdfund, gain new networks as four respondents believe this to be the case. One respondent explains, that the crowdfunding campaign, connected her to potential research partners and members of the public who are interested in the research project. Another researcher found herself a place to test the findings of the crowdfunded project, with a public health agency. More interestingly, crowdfunding of science might have an "pyramiding" effect as first described by Poetz and Prugi (2010), where actors can reach other actors from analogous fields and markets to gain knowledge for innovative ideas. The latter assumption can be given with the following VIVO code from one platform provider "researchers can create networks to other scientists and people in other fields, that have or might have, experiences with a subject, or know people that might help you do

your research". Therefore, the category "pyramiding" is added as being part of the core category "roles and influence of platforms" as well as having a relationship to this category 'gain new networks' as seen in figure 5 (page 39) and figure 10.

The possibility of researchers to educate the crowd and the public is also seen as a consequence for researchers by the respondents of the data. Moderate evidence from this study indicates that crowdfunding, can result in a more educated public, especially for crowd-donors who actively participate in crowdfunding. One researcher believes that crowdfunding would have been an ultimate turn down, if the researcher would not have the opportunity to educate people about the kind of research the team was crowdfunding. Lastly, weaker evidence from the data shows that when researchers crowdfund science, they get recognition from peers. Two researchers who participated in a university crowdfunding platforms got recognized within the university from students and other faculty members which lead more people to collaborate with the researchers on different science projects.

4.7.2 Consequences for crowd-donors

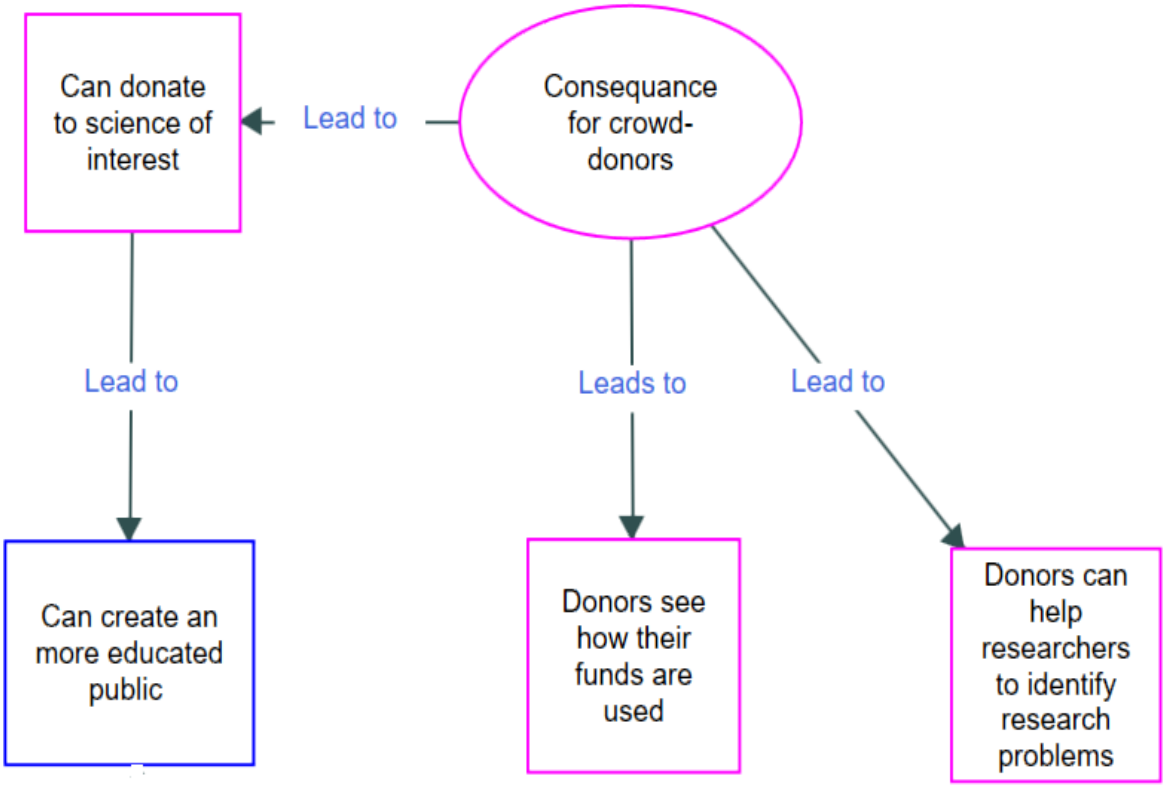


Figure 11. Consequences for crowd-donors

Three respondents of the data argue, with crowdfunding of science, crowd-donors can see where their money is used in real time. The argument is that other donation mechanisms do not offer the same amount of transparency on how crowd-donor's donations are used, in comparison to the crowdfunding of science mechanism. Two VIVO codes explain the latter: "Instead of donating to a research charity, where its very much a black box, with the crowdfunding mechanism, crowd-donors can see where their money is going"; "Some people would rather fund research directly, as a result, crowdfunding for research is maturing".

In addition, three respondents believe that, crowdfunding of science provides a unique opportunity for crowd-donors to support research that matters most to them, something that is not offered by other mechanisms since most sciences is locked behind closed doors. As the following VIVO code suggest; with crowdfunding, the public can fund research that interests them and they will learn a lot of interesting science in the process. This last VIVO code indicates a relationship between the category 'can donate to science of interest' which leads to 'An more educated public', because by being able to donate to science of interest it leads to a more educated public as seen in figure 11.

Lastly, two researchers and one university platform think that, via the crowdfunding mechanism, crowd-donors can help researchers by identifying scientific problems that need solving. In addition, by communicating directly with the public, researchers are getting a better understanding of what kind of research is most important to the public. One researcher explains by the following VIVO code "It is good for researchers to listen to the public because researchers are often in a scientific bubble and they don't realise what is common public knowledge and what is not".

4.7.3 Consequences for universities

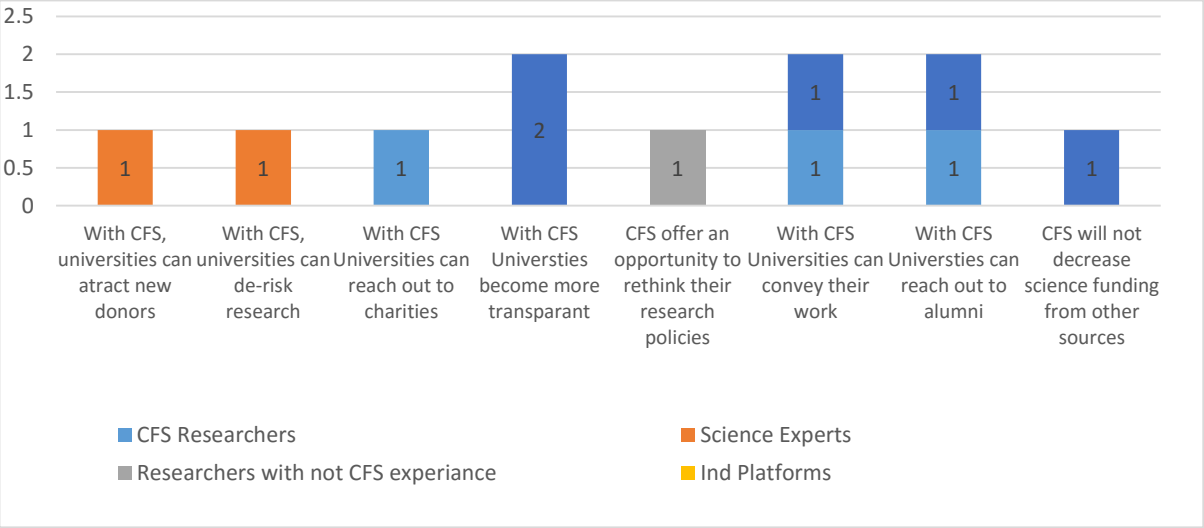


Table 6. Consequences for universities

There is weak evidence on what the consequences are, for universities when crowdfunding science either by using an external crowdfunding platform or by developing their own science platform internally. Data from table 6 shows that having an internal crowdfunding of science platform can make it easier for universities to recruit new donors, as well as facilitating the process of finding new ones, who are willing to donate to the universities for charitable purposes. If the industry and other charities are no longer able to donate to universities for various reasons, crowdfunding offers an alternative source of funding. Universities, having an internal or external crowdfunding platform for science projects, also increase transparency, as the universities can show what kind of research they are involved in directly via the crowdfunding platforms. When universities crowdfund science, the data further suggests, that universities may start to rethink the way they communicate their scientific projects, as many ongoing research at universities are unknown to the public.

The data also indicates that the crowdfunding mechanism offer an easy mechanism to connect with alumni both for donations and to convey the work done by the university as shown by the following VIVO code: "crowdfunding could be one of the easier ways of involving more alumni in our projects". In addition, universities having already adopted or are thinking of adopting a crowdfunding of science platform will not, according to the data, increase or decrease the amount of funds that universities receive from other funding sources, such as governments funds. Even though the explanations given above regarding consequences of crowdfunding for universities, no real conclusion can be drawn, as the data is to weak. This category is therefore considered as theoretically unsaturated.

4.8 Core category: Consequence, external to the crowdfunding mechanism

In this chapter, the consequences, external to the crowdfunding mechanisms will be presented. The two core categories of this chapter include: 'consequence for science funding and public policies' as well as 'consequences for the relationship between the science community and the public'. "External" to the crowdfunding mechanism means that the consequence occurs, partially outside or fully outside of the crowdfunding ecosystem. An alternative explanation for these external consequences are spill over effects, from the actors within the crowdfunding mechanism. Both these topics reached theoretical saturation.

4.8.1 Consequences for science funding and public policies

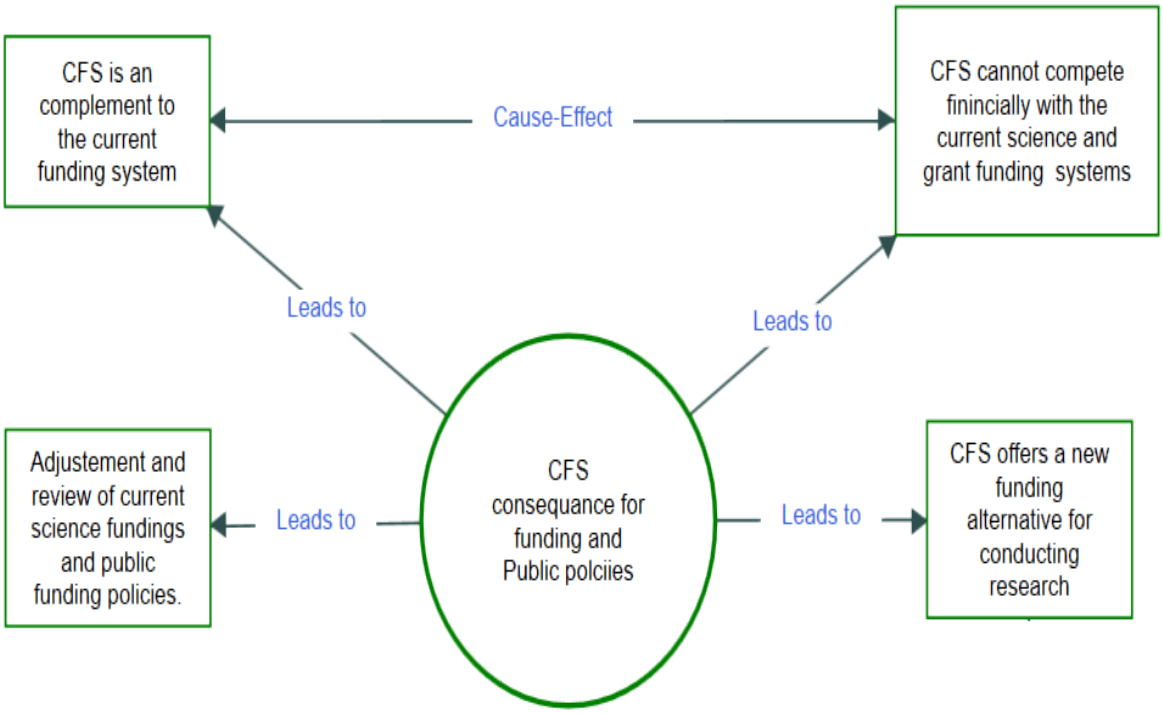


Figure 12. Consequences for science funding and science public policies

This study indicates very strong evidence that crowdfunding of science is a complementary funding mechanism to the current science funding and public policies practices. Nine of the respondents from the data argue that crowdfunding of science serves as a complement to the current science funding system, rather than being a replacement for it. VIVO codes associated with the topic can be expressed as the following: I don't think it could possibly do away with current funding system; a complement to it; designed to complement not replace; CFS is a complementary funding mechanism; alternative way of funding science; CFS don't influence the funding game. One argument, explained by four respondents of the data, for CFS only being a complementary system rather than a replacement to the traditional science finding system, is because crowdfunding cannot financially compete with different science bodies, grants systems, and other science agencies. Because of the explanation given above, there is a relationship between the category 'CFS is a complement to the current funding system' and the category 'CFS cannot compete financially with the current grant and funding system for research' with the argument that; because CFS can't compete with the traditional system, it becomes a compliment as seen in figure 12.

The coding process shows further strong evidence, that crowdfunding of science will indirectly make it possible to review the traditional funding of science and public policies. Seven respondents from the data think, that the crowdfunding mechanism could act as a counter balance for the traditional funding system, where new processes or alternative ways of

allocating funds for research could be explored. The latter explanation can be given with the following VIVO code "It's unlikely that there will be one best way of allocating research funding, and it seems doubtful that the peer review will be the best solution in all circumstances, since we have not yet tested other approaches". Another science expert thinks that not enough research is conducted on how to conduct research, and crowdfunding of science could be a starting point for opening up that discussion. One science expert from the data further argues, that crowdfunding science makes it possible to start a discussion on how to make the bureaucratic model of science more adaptable and flexible.

Lastly, weak evidence for the data suggests that the traditional science funding system and the crowdfunding mechanisms, could form a symbiotic relationship. Two science experts argue that the traditional funding mechanism, public funding policies and crowdfunding, could ultimately learn from each other. There is the argument that research councils could use the crowd's wisdom to approve studies that have already been marked up as containing scientific merit by these councils, hence the two mechanism could create a collaboration between each other.

4.8.2 Consequences for the relationship between the public and the science community

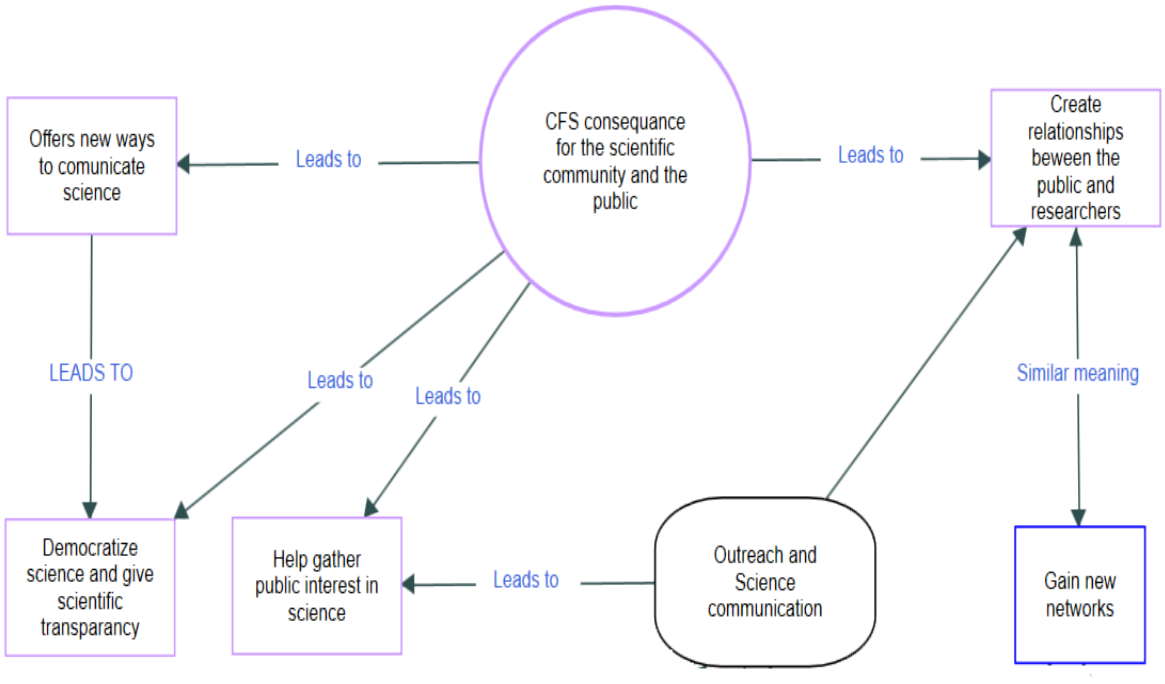


Figure 13. Consequences for the relationships between the public and the science community

From the coding process, there is very strong evidence that crowdfunding of science helps gather public interest in science and ten of the respondents from the data believe this to be the case. Many of the respondents see crowdfunding as a beneficial mechanism to help outside audiences to become more aware of the scientific process. VIVO codes associated with this topic can be summarized as follows: CFS gathers public interest, audience becomes more interested in research; CFS brings the general public closer to scientific inquiry; CFS will boost public engagement; CFS brings people closer to the scientific community; CFS is a real world method for the public to learn about the scientific process; CFS gathers public support. In addition, one platform provider further explains that the aim of their science platform is to support science communication and crowdfunding is a good way to integrate such communication practices, which in turn gather public interests in science. Based on the latter explanation there is a relation that can be made with the 'category: roles and influence of independent and university platforms' leading *to* 'science communication and outreach' *leading to* 'help gather public interest in science' as demonstrated in figure 13 and 5 (page 39).

Additionally, nine of the respondents of the data accept as true, that crowdfunding of science makes it possible to build relationships between researchers and the public since the mechanism will according to the following VIVO codes: build greater trust and communication between researchers and the public; establish new connections between researcher and the public; break down science barriers; create a new kind of dialogues between the public and scientists; bring closer connection between scientists and the public. From the latter VIVO codes, a new relationship can be made between the categories 'gain new network' and 'creates relationships between the public and researchers' since both categories show similarity of meaning as seen in figure 13. There is further very strong evidence from the data, as nine respondents believe, that crowdfunding science will democratize the scientific process. There is the believe from the respondents, that crowdfunding of science will; demystify the scientific funding process; CFS gives transparency; CFS makes is possible to share scientific stories that are hidden from the public; opening up how science works; democratize science; flatten science.

From the coding process there is further very strong evidence that crowdfunding science offers a new effective way to communicate science to an outside audience. One researcher explains that communication in crowdfunding is a two-way street and when scientists talk about their research, it also gives an opportunity to raise public awareness. Yet another researcher explains that the crowdfunding mechanisms is a good way to communicate science, not the only way, but a good one. Another researcher argues that "Instead of being in an ivory tower, it is a two-way street communication. This last explanation gives an indication for a relationship between 'category: new way of communicating science' *leading to* 'category: democratize science' as seen in figure 13.

5.0 Discussion

It is to the best of my knowledge that this study is not only the first attempt to find what the antecedents and consequences are for the crowdfunding of science, but it is also among the first studies that have been conducted on the topic of crowdfunding of science. Because of the limited scientific literature that exists on the topic, only a limited number of people have specialised knowledge on the subject. As a consequence, it becomes unclear if the amount of data collected for this study is sufficient enough in order to gain valuable insights on the topic of crowdfunding science and be able to draw any strong conclusions to answer the research question. However, deducted from this study, some clear evidence points to the fact that not only does antecedents and consequences exist when crowdfunding science, but the concept does also have a lot in common with the overall crowdfunding and public policy literature. In the following section, I aim to discuss and interpret the results found from previous chapter. First a general discussion on the main findings of this study will be made, where the literature review of this study will be taken into consideration. Secondly the implications from the results of this study for different stakeholders who directly and indirectly participate in the crowdfunding of science will be presented. Lastly, the limitations of this study will be presented followed by a general conclusion chapter.

5.1 Main findings

According to the coding process, with triangulation and theoretical sampling as data collection methods, a number of antecedents and consequences and the relationships between the categories of these antecedents and consequences were found. Antecedents found in this study were: motivations and deterrents by researchers to participate in crowdfunding science, deterrents of crowd-donors to participate in crowdfunding and the factors of influence for the amount of funds that can be raised by fund-seekers when crowdfunding science and demographics of researchers and crowd-donors in CFS. The internal consequences found in this study were: consequences for researchers, consequences for crowd-donors and consequences for universities. The external consequences found in this study were: consequences for the relationship between the science community and the public and consequences for science funding and public policies. The core categories that were seen both as antecedents and consequences were: role and influence of universities and independents science platforms and impact and relevance of crowdfunded science projects.

This study found that researchers need to put in a lot of efforts and time into a crowdfunding of science campaign since crowdfunding science is time consuming and hard work. Whether or not crowdfunding science is more time consuming than other types of crowdfunding, however remains uncertain from the results obtained in this study. The motivation by

researchers to crowdfund their research originates from a cause and effect relationship with the current grant and science funding system, where the latter makes it difficult for researchers to secure funds for their scientific projects, especially for young researchers which is also argue by (Fang, 2011; Melin and Daneel, 2006). The difficulties for researchers to get funds for research the traditional way as found from the results of this study, is supported by the public policy literature, whereas the traditional science funding process is considered to be time consuming (Spier, 2002) and competitive (de solla Price and Price, 1985; Lingard et al. 2008). The results from this study further indicates, that crowdfunding of science is especially beneficial for young researchers. However, no real conclusion could be drawn on the question whether or not young researchers are the main demographic on crowdfunding of science platforms, because that core category did not reach theoretical saturation. There was, however, evidence from this study that the demographic of crowd-donors consists of diversified nationalities as of from which there is the assumption that geographical proximity for science investments by crowd-donors do not matter when crowdfunding science.

The latter explanation, that geographical proximity is not important for crowdfunding science, correlates with other findings from this study, which point to the fact that the crowdfunding of science mechanism reduces geographical barriers between different stakeholders who want to participate in scientific research. Strong evidence from the study further shows that crowdfunding of science as a concept, could be used as a tool for democratizing the scientific process. However, it becomes important to notice that the data used for this study mostly originates from respondents who already have an experience with crowdfunding science. As such, some questions remain on how the crowdfunding of science ecosystem affects the existing scientific knowledge gap for people who do not know what crowdfunding of science is or has never used it, nor want to use it. Even though spill overs effects from the internal crowdfunding mechanism onto external fields have been found in this study, it still remains uncertain, exactly how these spill over effects would affect outside stakeholders.

Interestingly, only weak evidence shows that researchers are especially motivated to crowdfund science because they want to open up the scientific process. Opening up the scientific process has lately been widely discussed in the popular media and by scientists who are especially keen to see an open access for scientific journals, hence breaking science free from its ivory tower. From the results of this study, there is evidence that in order for crowdfunding to be of relevance and to have an impact for scientific advancement, researchers need to show the results of their crowdfunded science projects after completion. In addition, the best scenario in order for crowdfunded science projects to have an impact and to be of relevance for scientific advancement, is if the crowdfunded research projects are peer reviewed in the same way as other non-crowdfunded projects. The fact that respondents believe that crowdfunded projects need to be peer reviewed after completion is a surprising and non-expected result prior to this study, since peer review and ultimately science publications in core scientific journals are seen as the black sheep of free scientific knowledge sharing. However, peer review is still perceived by the respondents of this study as the stamp of approval to assess

the quality of scientific projects and whether or not there is truth in their beliefs this can become a topic for future discussion.

Crowd-donors that donate to researchers via a crowdfunding of science platform, are willing to do so because of altruistic, non-altruistic and philanthropic reasons. These findings are similar to other donation based motivational factors in the crowdfunding literature, as the same motivational factors were found in the studies by (Burtch et al. 2013; Jian and shin 2015; Lehner et al. 2013; Boeufs et al. 2014). On similar note, the results of this study reveal that the crowdfunding mechanism gives crowd-donors who donate to scientific projects in crowdfunding the possibility to contribute to science that interests them, helps researchers to identify research problems and helps to see how their investments are used in real time. Crowd-donors not seeing how their funds are being used by fund-seekers are found to be a deterrent from the crowdfunding literature and this makes crowd-donors less motivated to participate in crowdfunding (Gerber and Hui, 2011). Because of the evidence from this study, that indicates that crowd donors can follow-up in real time how their donations are used, no deterrents of crowd-donors to participate in crowdfunding of science where found. I cannot argue that no deterrents for crowd-donors exist when donating to science via science platforms, but this study could not identify any and further research is therefore needed on the topic.

One cited argument as a deterrent from the crowdfunding literature, is that once new products and services are launched on crowdfunding platforms, the products and services become visible to competitors, which can discourage fund-seekers to participate and raise funds in crowdfunding (Reidl, 2013), (Adams, 2013). In the crowdfunding of science this deterrent was never found since it is not possible to reproduce nor to copy a research project based on what is posted on a crowdfunding of science campaign. In addition, intellectual property contracts exist when crowdfunding science to protect fund-seekers. In fact, the only deterrent that was found in this study was related to researchers who plan to crowdfund their research projects, where strong evidence points to communication and outreach activities as the sole deterrent for researchers to participate in crowdfunding science. Science communication being seen as a deterrent for other type of scientific processes has also been identified in the science communication literature, more precisely in the study by (Byrnes et al. 2014; Shanley and Lopez, 2009; Kreimer et al. 2011; Mizumachi et al. 2011).

Nevertheless, science communication and outreach activities when crowdfunding science, is perceived as an important factor of influence for the amount of funds that researchers can raise in a crowdfunding of science campaign. Science communication and outreach activities in crowdfunding are also important practices for the democratization of science since it leads to scientific-public relationship creation, as well as to help gather public interest in science. From the science communication literature, it is argued that, when citizens engage meaningfully and in a deliberate way with science experts, it will lead to a knowledgeable society (Felt and Wynne, 2016). There is no doubt, from the results of this study, that crowd-donors who are active on crowdfunding of science platforms could gain knowledge about science, but

assuming that crowdfunding, based on its current size, could create a whole knowledgeable society becomes rather speculative.

Being able to practice science communication and outreach is not the only factor which influences the success of a crowdfunding campaign. The network of researchers, skills of researchers as well as the amount of funds asked for and the characteristics and attributes of the crowdfunded science projects, play a vital role for the amount of funds that can be raised in a crowdfunding of science campaign. Similar factors of influence for the amount of funds that can be raised in a crowdfunding campaign were found in the crowdfunding literature, more specifically in the studies by (Cordova et al. 2013; Qui, 2013; Ordani et al. 2011; Mollick, 2013; Agrawal et al. 2010). However, contrary to the crowdfunding literature, the ability to explain complex scientific problems in simple terms is a skill that is needed when crowdfunding of science but non-consistent with skills needed for other crowdfunding types, as deducted from the crowdfunding literature.

One similar topic, being able to build an audience, is an especially important factor of influence for researchers when crowdfunding science. Audience building will influence how well researchers are able to raise funds for their projects in rounds as well as being an influence for career advancement, especially when researchers crowdfund research projects in the longer run. The findings of this study further accentuate that crowdfunded research projects need to have the attribute of 'appeal' in the eyes of crowd-donors. The attribute of 'appeal' in crowdfunded science projects is an important factor of influence for the amount of funds that can be raised when crowdfunding science. The attribute of 'appeal' as an influential factor for the amount of funds that can be raised when crowdfunding, is a factor that is not found in the crowdfunding literature. There are notions in the crowdfunding literature concerning the importance of researchers to have a correct use of rhetoric and presentation of the content in their campaign page, as seen in the study by Berg & Lovéus (2014). Whether or not the factors of 'proper use of rhetoric and presentation' of the content on the campaign page are correlated or similar to the factor of 'appeal' found in this study, can be a topic for further discussion.

There is very strong evidence from this study, that the most suited science projects to crowdfund are pilot studies, primary data studies and studies of low cost. Because the crowdfunding mechanism is most suited to low cost projects, some question the crowdfunding mechanism legitimacy as a tool for scientific advancement. However, deducted from the results of this study, no evidence was found on an exact average amount of funds in numerical forms that can be raised with the crowdfunding mechanism. Except for some indications of a funding ceiling and some assumptions of an average funding amount that was given by the respondents of the data. It is possible that the amount of funds that can be raised when crowdfunding science cannot be generalized and the amount of funds that can be raised when crowdfunding scientific projects will depend on the specific crowdfunding of science platform that researchers and crowd-donors are using. One reason why it is so difficult to make a correct assumption on the

average amount that can be raised when crowdfunding science on a numerical scale could be, because so many factors have influence on this issue.

Similarly, this study shows strong evidence that the crowdfunding of science mechanism cannot compete financially with the traditional funding and grant system, which in turn makes the crowdfunding mechanism to be a complementary funding pool for scientific research. There is the argument that no contradictive or negative thought can be made if a new mechanism can bring more funds to the science funding pool. Nonetheless, how much the crowdfunding mechanism cannibalizes donors who would otherwise donate to let say the Red Cross and then donate to crowdfunding instead, could be an interesting subject of debate. As stated before, there is the assumption that the crowdfunding mechanism is more suited for low cost projects, pilot studies, and primary data studies, hence the argument for crowdfunded projects not having a real impact for science advancement. However, scientific research projects that are crowdfunded can give researchers a possibility to start with data gathering for their research project. This primary data then becomes an entry port for more science funding via the traditional science funding system, because researchers gain credibility in the eyes of the funding committees.

The crowdfunding mechanism can fund innovative, exploratory, non-conservative projects and high risk projects that are not often funded by the current grant and science funding mechanisms, as the latter is conservative by design (Barber 1961; Fang, 2011; Baldwin and Seto, 1997). As such, the crowdfunding mechanisms could be a good tool to fund those types of projects where researchers can obtain preliminary data that can then be used to get more grants and science funds. In addition, based on the results obtained from this study, public policies and science funding decision-makers could use the crowdfunding mechanism to explore alternative ways for allocating funds for research. How this could be done in practice cannot be derived from the results of this study, but it offers some interesting thought on how two different science funding systems could benefit from each other for the advancements of scientific research.

Crowdfunding being a tool used by researchers to gain preliminary data and secure funds via the traditional grants and science funding system is not the only benefit that the crowdfunding mechanism offers to researchers. Crowdfunding also gives researchers a new tool to raise funds for research projects quickly, something that the traditional science funding system does not offer, as that system is seen as slow and it takes a long time for researchers to get the funds once an application has been accepted. Some indications from this study further point to the conclusion that crowdfunding science advance researcher's careers. It is debatable that a one-time crowdfunding campaign advances the career of every researcher who crowdfund a scientific project. Instead the result of career advancement for researchers who crowdfund science, may be in the underlying parts of all the side activities that researchers have to take part in when having a crowdfunding of science campaign, such as having to build an audience and having to practice science communication and outreach. In addition, researchers who

crowdfund science can advance their careers because of the media attention they receive when they have a crowdfunding campaign. However, being able to put any real measurement of how researchers can advance their career based on the publicity received from a crowdfunding campaign and how much a crowdfunding campaign is picked up by the media, is not possible based on the results obtained in this study.

According to this study, university and independent platform providers have an influential role in the crowdfunding of science mechanism. Independent crowdfunding of science platforms do to some degree have impact on the possibility of researchers to get their project funded and completed, based on the amount of help provided to researchers by these platforms. Science platforms also set the game for intellectual property rights of the projects that are posted on these platforms. The crowdfunding platforms will also, based on the results of this study, influence the impact and relevance of crowdfunded projects as a result of their quality control mechanisms. Quality mechanisms in science platforms are especially important because of the crowd's incapability of making science investment decisions as opposed to crowd-donors in equity crowdfunding where crowd-donors are able to distinguish the same quality signals as venture capitalists for making crowdfunding investment (Mollick, 2013). However, from the results of this study the crowd incapability for making science investments decisions do not originate because of science illiteracy, but because of other factors such as: the quality of the information provided by the platforms and researchers about a crowdfunded project and the specialised scientific expertise that is required in order to understand different science disciplines which only a few people possess.

Quality controls are not the sole roles and responsibility of science platforms in crowdfunding as deducted from this study. According to the crowdfunding literature, platforms connect donors and researchers with each other, serve as an infrastructure and facilitate transactions between the actors who uses the platform. Platforms can further be seen as enablers of innovation, permit problem solving capabilities, facilitate knowledge sharing and reduce transaction costs (Nambisan, 2009). From this study there were no real findings that this claim by Nambisan holds true for the crowdfunding of science. Nevertheless, there are assumptions that crowdfunding of science platforms facilitates 'pyramiding', a concept first developed by Poetz and Prugl, (2010) which offer a possibility for researchers to reach other researchers who have specialised knowledge in a certain field. In addition, there is evidence that science platforms facilitate the possibility of crowd-donors and researchers to work together in order to solve different scientific problems, which are activities that have many resemblances to crowdsourcing.

5.2 Practical implications of this study

As pointed out in the beginning of this chapter, crowdfunding science is a new phenomenon and therefore I think it is important to give practical recommendations to different stakeholders who are directly or indirectly participating in the crowdfunding of science mechanism. This chapter will therefore present the practical implications for fund-seekers (researchers), crowd-donors, independent science platforms and public policy decision makers. Because the data of this study was too weak to draw any conclusions for university platforms, that stakeholder group will be excluded from this section.

5.2.1 Fund-seekers (researchers)

Fund-seekers need to be aware of the amount of funds that can be raised with the crowdfunding mechanisms. Researchers therefore need to be able to set the right funding goal. If the funding goal is not met for a crowdfunding of science campaign, in most cases the campaign will be cancelled due to the 'all or nothing model' that often exists in science platforms. Crowdfunded science projects must have a perceived factor of 'appeal' since the factor of 'appeal' has a strong influence upon the amount of funds that can be raised with a crowdfunding of science campaign. In addition, researchers should be aware of the importance of being able to build an audience during their crowdfunding campaigns, as well as being able to practice scientific communication and outreach activities and to promote their researcher projects with social media.

The networks of researchers, in term of their online fan base and online communities as well as researcher's personal network of family and friends, prior to a crowdfunding of science campaign influences the amount of funds that can be raised during a crowdfunding of science campaign. Therefore, researchers need to reflect on the amount of people in their immediate circle who are willing to donate to the researcher's crowdfunding campaigns. Furthermore, crowd-donors are motivated to give donations to researchers crowdfunded science projects because they want to be part of the scientific process. Therefore, researchers should not feel uncomfortable to post updates and communicate actively with crowd-donors. Researchers should have an open attitude towards crowd-donors who are willing to help by reaching out to their networks to find other crowd-donors and by supporting researchers by giving them feedback and suggestions on the scientific projects being crowdfunded. Lastly crowdfunding of science offers a number of benefits for researchers such as building new networks, learn new skills and help educate people about science.

5.2.2 Crowd-donors

Crowd-donors should be aware that researchers who crowdfunding their research, often do so because they have difficulties in securing science funds and grants for their research. By donating to their research via crowdfunding, crowd-donors are making it possible for researchers not only to advance science, but also to help researchers in their careers. If crowd-donors are uncertain about the credibility of different crowdfunded science projects on science platforms, they might look for the mechanisms that are used by science platforms in order to certify the quality of projects being posted on these platforms. In addition, when crowd-donors are participating in the crowdfunding of science, they will be able to gain more knowledge about science and build new networks with researchers as well as being part of scientific research.

5.2.3 Independent science platforms

Platforms play an important role and exert a central influence when connecting researchers and crowd-donors via their science platforms. The administrators of the platforms should be aware that researchers mostly prefer to post their science projects on platforms that are seen as legitimate. In addition, the amount of help platforms provide to researchers in terms of advice, influence the amount of funds researchers are able to raise in their crowdfunding campaigns. Some are sceptical about the crowdfunding mechanism, as they believe that low quality scientific projects and fraudulent projects could be funded. Consequently, it is important for platforms to show transparency and to communicate with stakeholders how the platform guarantees that only high quality projects are posted on their platforms.

5.2.4 Science policy decision makers

Based on the results of this study, science policy decision makers can assess the antecedents found in this study, in order to better understand the current state of affair of their own science policies, more specifically, why researchers are motivated to turn to crowdfunding for funding their research projects. Decision makers within public policies could also take the necessary steps to ensure that crowdfunding of science is seen as a legitimate mechanism for raising funds for research. In addition, decision makers could experiment with the crowdfunding of science mechanism as a tool to subsidy different low cost and pilot's studies projects. Science decision makers, science funding agencies or government could also try building their own national platforms, where the public can have the opportunity to be part of and participate in science.

Having a national science platform could in turn reduce science illiteracy and create a more educated public which leads toward a more knowledgeable society.

5.3 Limitations of this study

Validity in qualitative research involves finding out the degree to which claims made in a study by the researcher are in fact corresponding to reality (Eisner & Peshkin, 1990). The first limitation of this study is the amount of respondents from which the data was collected. In this study 15 interviews were held with 5 different sample groups. If more respondents were added to the sample groups, other results may have been found from this study.

Secondly, crowdfunding of science is a whole new concept, and in order to be able to gain some understanding of the topic, scientific literature from other science fields is used. These science fields were chosen inductively in order to develop the inductive conceptual framework (figure 2 on page 24). The conceptual framework was then used deductively to develop the interview guide and the coding scheme for data analysis. It therefore comes into question: if other fields of scientific literature were used to draw the inductive conceptual model, would the conceptual framework then differ? In addition, in the process of deduction, from the conceptual model to the interview guide, if the conceptual model were constructed differently as a result of the inductive process, possibly the open interviews questions could have looked differently, hence affecting not only the responses given by the respondents, but also the overall results obtained from the coding process.

No primary data for the sample group 'science experts with knowledge of crowdfunding of science' were found for this study and that sample group needed to be complemented with secondary data. However, the amount of data that were obtained for that sample group were less than other sample groups which creates data irregularity and because of that, studying a phenomenon from different perspectives become more difficult. In addition, with the triangulation of data method, replication of results becomes exceedingly difficult, thus making the overall validity of the study to be questioned since replication of a research project is usually considered to be a necessary step in scientific progress (Jick, 1979).
The concept of theoretical sampling and theoretical saturation also have some limitations for this study. There are no factors that can define the correct sample size in qualitative studies. It therefore became difficult to assess when the data being collected is actually enough and contrary when more data is needed to answer the problems being studied. The term of 'theoretical saturation' is a vague terminology that refers to 'where no new or relevant insights seem to be emerging from the data being collected' (Charmaz, 2006). Even though I believe to have reach some degree of theoretical saturation, other may believe the opposite based on the results of this study.

Fourth, in this study one person was involved in the coding process and the question rises how the results would have differed if two or more persons would have been responsible for the same coding process. The results may have differed if another person would have been responsible for the coding process. This was the first time that I used the coding process as a technique for data analysis and as described by (Glaser, 1992) the coding process is considered to be a difficult and daunting task for young and inexperienced researchers such as myself. As such it would have been interesting to see how the results of this study would have looked like, if a more experienced researcher would have performed the coding process with the same primary and secondary data. In future research it seems advisable that at least two coders are involved and rater agreement is calculated. Finally, when coding data, it is importance to look for negative views of the topic being studied in order to avoid bias, however most opinions on the crowdfunding of science were on the beneficial tones. This means that either the crowdfunding mechanism for funding scientific researcher truly has as many benefits as mentioned in this study or the secondary data used for the data analysis of this study had a positive inclination toward the crowdfunding mechanism for funding science which could result in some bias.

5.4 Implication for future Research

There should be further research on the crowdfunding of science topic. During the process of this study some interesting future research topics were identified. First it would be interesting to compare the crowdfunding mechanism with other types of crowdfunding mechanism, like equity, reward etc. for similarities and differences. Secondly, as mentioned in the limitation section of this study, more research is needed for the weak core and axial categories where no concrete conclusion could be drawn. Furthermore, this study has a broad cultural context as the respondents from the data originate from the United States and several countries in Europe. It would therefore be interesting to gain more understanding of the crowdfunding mechanisms in regard to a more narrowed country demographic. Lastly, due to data overlap it was not possible for this study to conduct any cross tab analysis of the different sample groups. As such it would be interesting to determine if sample groups view the crowdfunding of science differently. Lastly, this research is experimental in nature. In future research more robust quantitative analysis with hypothesis testing for each core categories should be made in order to reject or accept the results found in this study on a statistical basis.

6 Conclusion

While the crowdfunding concept has been widely explored in the scientific literature, the crowdfunding of science is an immature and fragmented topic which offers a new subject to study both for scholars and practitioners alike. To the best of my knowledge, this study is the first attempt made to fill the knowledge gap that exists for this new crowdfunding type. In order to gain an understanding of the crowdfunding of science topic, I started out with the exploration of a broad research question concerning the 'antecedents and consequences of crowdfunding science'. By conducting fifteen interviews with four different sample groups as well as analysing secondary data, new knowledge was gained of this novel phenomenon of crowdfunding science. The results of this study hereby add onto the limited extent of literature surrounding the crowdfunding literature, as well as to some degree the academic literature adjacent to science funding and public policy.

According to a coding process (VIVO coding, open coding, axial coding and selective coding) and an inductive-deductive methodological approach, I was able to find core categories inductively as well as core categories that emerged deductively from the coding process. The core categories of antecedents identified are: factors of motivation by researchers and crowd-donors and deterrent of researchers to participate in crowdfunding of science and factors of influence for the amount of funds that can be raised when crowdfunding science. The core categories that was both identified as antecedents and consequences are: the role and influences of university and independent platforms when crowdfunding science and the impact and relevance of crowdfunded science projects. The internal consequence to the crowdfunding of science ecosystem are consequences concerning researchers, crowd-donors and universities. This study further reveals that the crowdfunding of science ecosystem has a number of possible spill over effects which create consequences for the relationship between the science community and the public and consequences for science funding and public policies. By further analysing the primary and secondary data that was collected for this study, many similarities and differences were found in comparison to the overall crowdfunding literature.

The similarities imply that, even though crowdfunding of science, as argued by Hui and Gerber (2015) is unique in comparison to other crowdfunding types because of the nature that is scientific, the crowdfunding of science mechanism is not that different to other crowdfunding types after all, for three reasons. First the motivational factors of crowd-donors to participate in the crowdfunding of science are similar to those that can be found in the crowdfunding literature. Secondly, the influential factors for the amount of funds that can be raised in crowdfunding are similar to other crowdfunding types, suggesting that the underlying crowdfunding mechanism remains the same regardless of what you crowdfund. The sole factor which was exempted from this rule was the specialised type of skills needed by fund-seekers when crowdfunding science, such as practicing science communication and outreach and be able to explain complex scientific problems in simple words. Third, just as other type of

donation based crowdfunding platforms, there is little or no need for an extensive legal and political framework of regulations which is similar to other donation based crowdfunding models. However, the consequences found in this study and the possible spill overs effect from the crowdfunding of science ecosystem into other external fields as found in this study, are consequences that are solely related to the crowdfunding of science ecosystem.

This study has some interesting implications for researchers, crowd-donors, university and independent platform providers as well as outside stakeholders to the crowdfunding ecosystem. The results of this study have implications for researchers who want to crowdfund science since this study gives indications of what will work and what will not work when crowdfunding science. Results indicate that factors of influence for the success of a crowdfunding campaign are related to the skills of researchers, the networks of the researchers, the amount of funds asked for by researchers as well as the discipline and attributes of the crowdfunded projects. In relation to the crowdfunded projects, this study found that the disciples and attribute of projects is not that relevant, but projects must have 'appeal' and 'seed projects' and low 'cost projects' are the most suited to crowdfund. The roles and influential factors that the platforms play for the legitimacy of the crowdfunding mechanism showed some interesting results because of the importance of their quality mechanisms, especially since crowd-donors cannot distinguish between the quality of different scientific projects.

The motivation of researchers to crowdfund their research projects with the goal of raisings funds, give scientific policy makers evidence of the current state of their funding policies for research funding i.e. grants are time consuming, difficulties for young researchers etc. The results of this study further offer some interesting ideas on how the crowdfunding mechanism could be used as a scientific innovation mechanism as well as a tool for closing the knowledge gap that exists between the scientific community and the public. Would It be possible for governments to subsidies crowdfunding of science platforms to promote the funding of scientific pilot studies and low cost projects? Would it further be too risky to assume that creating a national crowdfunding of science platform run by governments where the public can donate to science projects, would be a good idea? This study already offers some indication that the public, universities and researchers are interested and motivated to post and fund research, so the question remains how long it will take to see a further increase of use of the crowdfunding of science mechanism to fund research. Because some core categories in this study reach theoretical saturation while other did not, the results obtained in this study provide an interesting point of departure for future research.

7 Bibliography

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8 Appendix

8.1 Results of the coding process

NRBT	Open coding	Axial coding	Selective coding	
2	• Scientific projects require expertise that the public does not have	Crowd's capabilities in making science investment decisions	The role and influence of the CFS platforms	Both Antecedents and Consequences
4	• The crowd can't differentiate between good and bad projects			
1	• The crowd does not donate on the basis of scientific merit			
1	• The crowd have no way to differentiate between good and bad projects			
1	• The crowd can differentiate between good and bad projects			
2	• Adopt and all or nothing model	Quality control mechanisms in crowdfunding science		
5	• Only work with universities			
8	• Internal platform vetting process			
1	• Projects need to answer a research question			
1	• Verification of the production of an end report			
1	• Control of the ethics of the projects			
2	• Verification of the budget breakdown of projects			
2	• Validation of the scientist of the project			
4	• Verification of the credibility of the project			
1	• There is terms and conditions and privacy polcies for the IP right of researchers	Intellectual property rights and theft		
1	• There is terms and conditions and privacy polcies for the ownership of the crowd			
3	• It is not possible to copy anidea based on what exists on an campaign page			

NRBT	Open coding	Axial coding	Selective coding
5	• Diversified nationalities of the crowd	Nationalities	Demographics of crowd-donors and reaserchers in platforms
1	• Gender and age depends on the projects	Gender and age	
1	• Male Majority on science platforms		
1	• Not a specific age group		
2	• Younger generation of crowd-donors		
1	• Younger generation of scientists		
1	• Geographical distance is irrelevant for crowd investement		

NRBT	Open coding	Axial coding	Selective coding
1	• Low quality or fraudulent projects cannot get through with CFS	Quality of projects	Impact and relevance of crowdfunded science projects
2	• Low quality or fraudulent projects can get through with CFS		
3	• CFS projects need to show results and get peer reviewed to have an impact	Outcome of projects	
5	• CFS cannot raise enough money to make and real impact	Amount of funds raised in CFS	

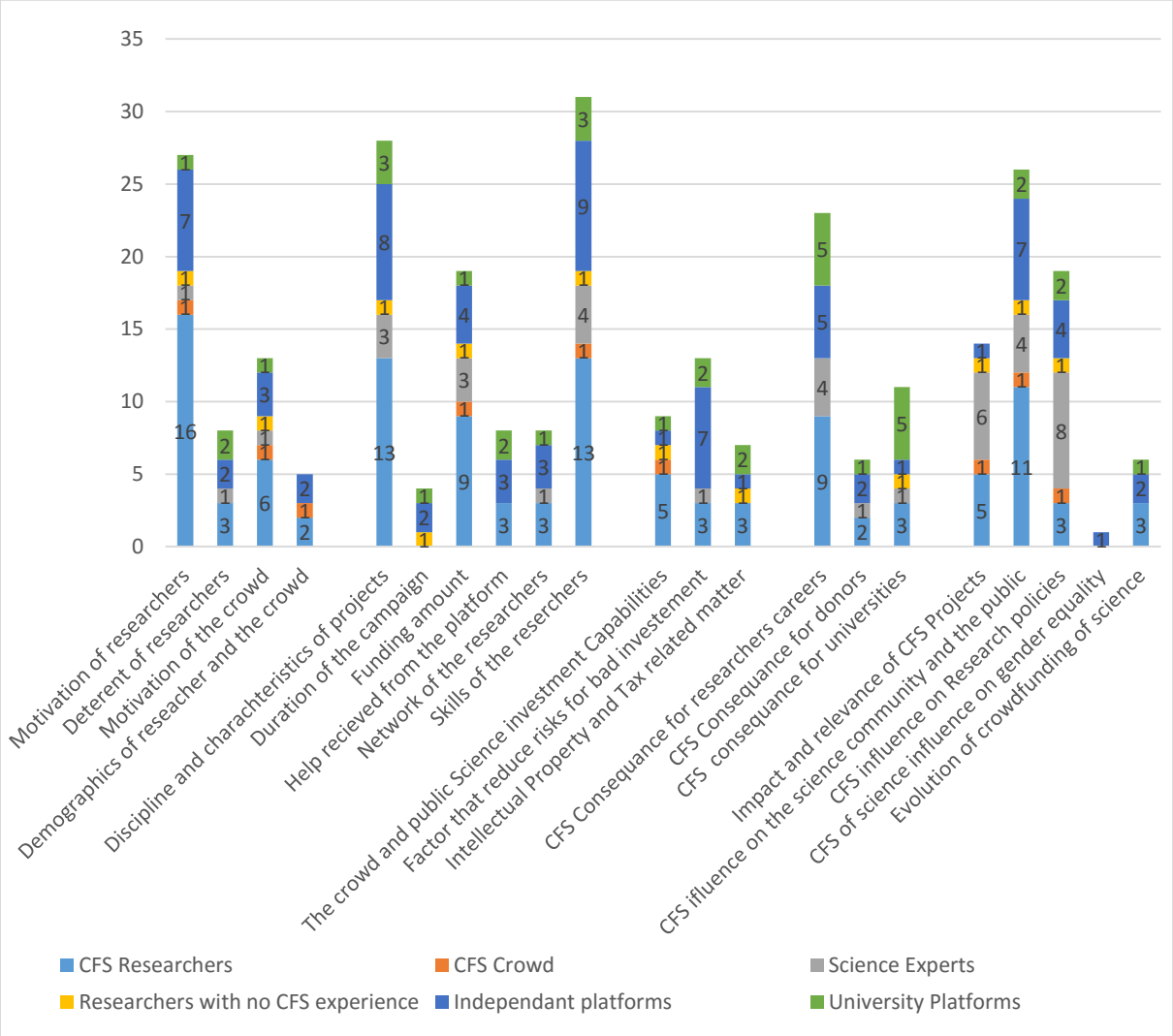
NRBT	Open coding	Axial coding	Selective coding	
1	• Will not impact the researchers career negatively	Consequence for researchers	Internal to the crowdfunding mechanism	Consequance of crowdfunding science
1	• Gain venture capitalist interest			
2	• Get recognition from peers			
4	• Gain new networks			
4	• Advance the career of researchers			
4	• Learn new skills			
5	• Offer an opportunity for independent researchers			
6	• Gain publicity in the media			
7	• Gain credibility for receiving grants			
10	• Offers new source of income for researchers			
14	• Offer an opportunity for early career researchers.			
3	• Can donate to science of interest	Consequence for Crowd donors		
3	• Donors see where their money is going			
3	• Donors can help researchers to identify research problems			
1	• CFS will not decrease science funding from other sources	Consequence for universities		
2	• With CFS universities can reach out to alumni			
2	• With CFS universities can convey their work			
1	• CFS offer an opportunity to rethink their research polices			
2	• With CFS universities become more transparent			
1	• With CFS universities can reach out to charities			
1	• With CFS universities can de-risk research			
1	• With CFS, universities can attract new donors			
1	• CFS empower the public to fund science	Consequence for the science community and the public	Exteral to the crowdfunding mechanism	
1	• CFS changes the way the public sees science			
2	• CFS break down geographical barriers in science			
4	• CFS offers the possibilty for an more informed and educated public			
8	• CFS gdemocratise the science process and offers transparency			
8	• CFS offers new ways to communicate science			
9	• CFS give the possibility of building relations between the public and researchers			
10	• CFS help gather public interest in science.			
1	• CFS and current funding system could learn from each other	Consequences for research funding and public policies		
1	• CFS will help science decision makers base funding decisions on public interests			
3	• CFS cannot compete financially with the current science and funding system			
7	• CFS offers the possibility making adjustments of current funding system			
9	• CFS will be a complement to the current science and funding system			

NRBT	Open coding	Axial coding	Selective coding	
1	• Want to work with the community and the public	Motivation of researchers to participate in CFS	**Motivation and deterrent of researchers to participate in CFS**	
1	• Want to be independent from science institutions			
1	• Want to try something new			
1	• Grant and funding proposals cost money			
1	• Want to create a pilot study			
2	• Want to open up the science process			
2	• Frustration with current science funding system			
3	• Take long time to get grants and funding money			
6	• Lack of science funding			
6	• Did not get federal funding			
6	• Grants and funding proposals are time consuming			
9	• Difficult to get funding for young researchers and new scientists			
12	• Grants and funding is hard and competitive to get			
1	• Ask money from friends and family	Deterents of researchers to participate in CFS		
1	• Go beyond the comfort zone			
1	• The need to be a salesman			
1	• Need to break out of immediate circle			
1	• Need to be extraverted			
9	• Outreach and science communication			
8	• Be part of scientific research	Non-altruistic	**Motivation of the crowd to participate in CFS**	
3	• Be part of something bigger			
5	• Finding a solution to a problem			
2	• Having a say in scientific research			
1	• Receive and reward			
1	• Curiosity			
1	• Put money to good use	Altruistic		
1	• Contribute to a better world			
1	• Make a difference			
4	• Contribute to science			
5	• Act of Philanthropy and doing good	Philatrophy		

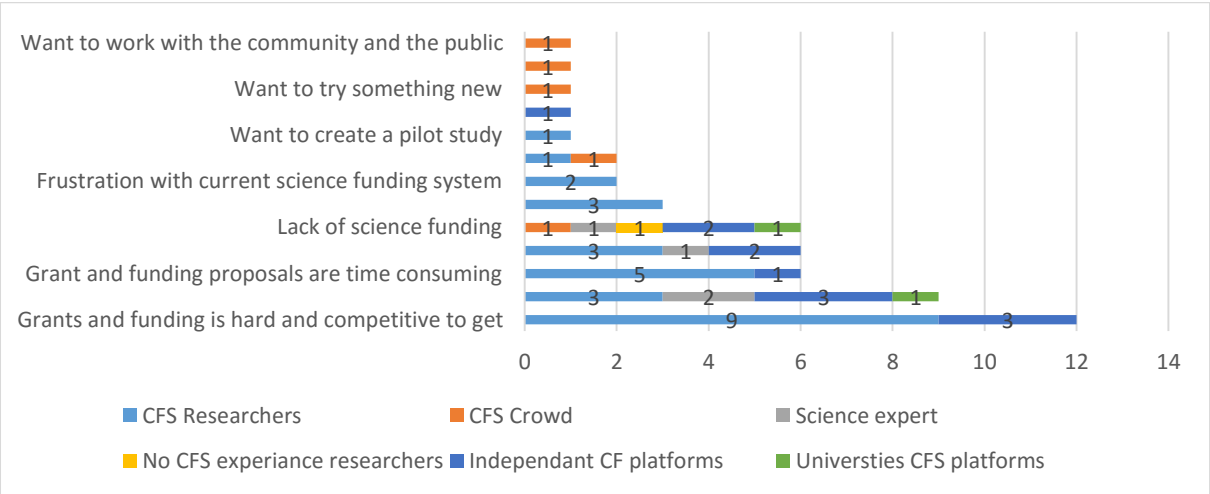
NRBT	Open coding	Axial coding	Selective coding	
	Discipline	Discipline and attributes of projects that are likely to get funded in CFS	**Factors of influence for the amount of funding that can be raised in CFS**	**Antecedents**
2	• Interdisciplinary research			
1	• Technological projects			
2	• Medical research			
1	• Applied research			
2	• Humanities and social sciences			
3	• Fundamental research is not good for CFS			
	Attributes			
2	• Innovative projects			
1	• Abstract projects			
1	• Projects with a local issue			
1	• Projects with a social outcome			
3	• Projects being politically touchy and controversive			
1	• Projects being cool and funny			
2	• High risks projects			
1	• Feel good projects			
13	• Seed projects, small projects and pilot studies			
11	• Discipline does not matter as long as there is appeal			
1	• There is a funding ceiling	Funding amount asked for in CFS		
7	• Start with a small amount			
5	• Raise money with rounds			
7	• Projects with low cost.			
2	• Help received in setting up the campaign on the platform	The amount of help received from the science platforms		
1	• Help received on how to find backers			
2	• Help received about how to market campaigns			
2	• Advice, education and support received			
1	• What the researchers team consists of	Network of the researchers		
4	• Size and quality of the researcher's personal network			
4	• Size of community and fan base prior to launch			
2	• Be able to use effective rhetoric in video and presentation of campaign page	Skills and attributes of researchers		
3	• Be able to create public knowledge and awareness			
3	• Be able to be transparent and honest			
5	• Be able to build an audience and a fan base			
5	• Be able to explain complex scientific problems in simple words			
6	• Be able to post progress and updates of the projects			
6	• Be able to set the right funding goals			
12	• Be able to work with social media			
15	• Be able to in the time since CFS is time consuming and hard work			
22	• Be able to practice effective science communication and outreach			
3	• Longer campaign does not influence reaching the funding goals	Duration of the campaign		

14 Results of the coding process and the number of participant who believes and open node to be true showed by the column (NRBT

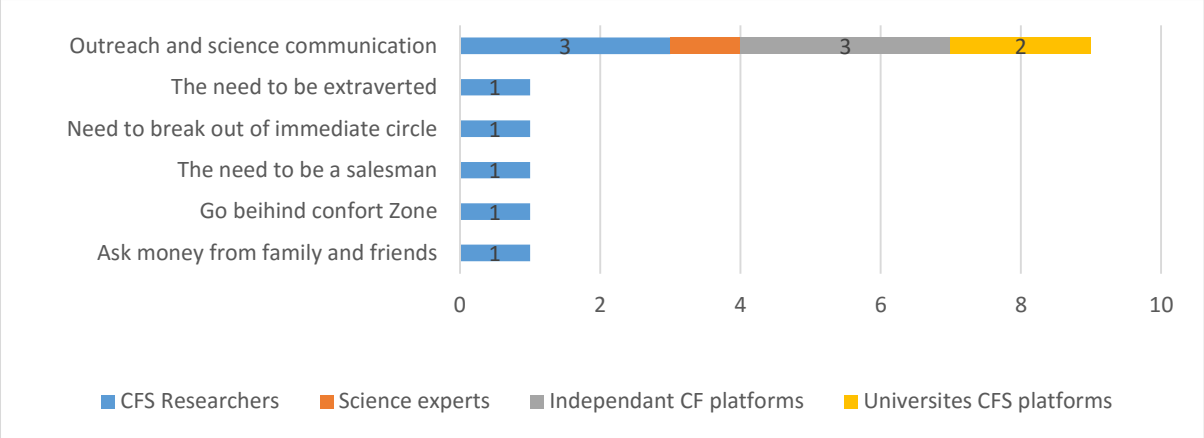
8.2 Detailed results of the coding process with separated samples groups



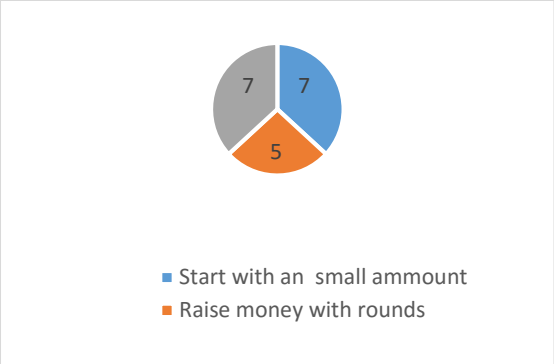
15 Frequency of participation



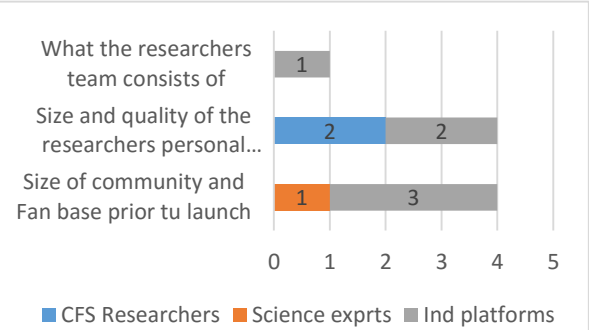
16 Motivation of researchers to participate in CFS



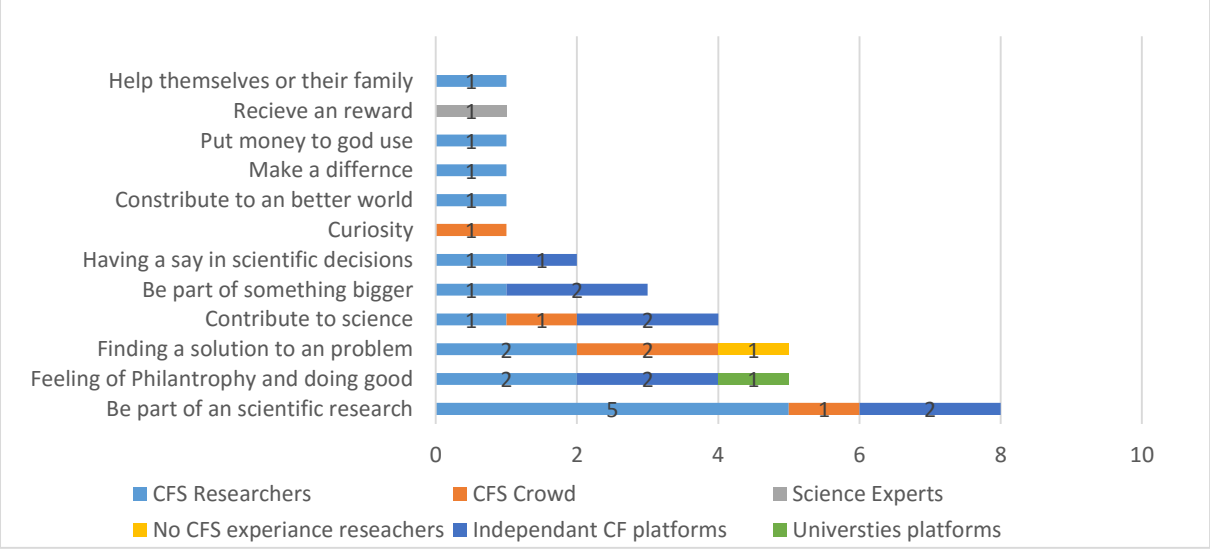
17 Deterrent of researchers to participate in CFS



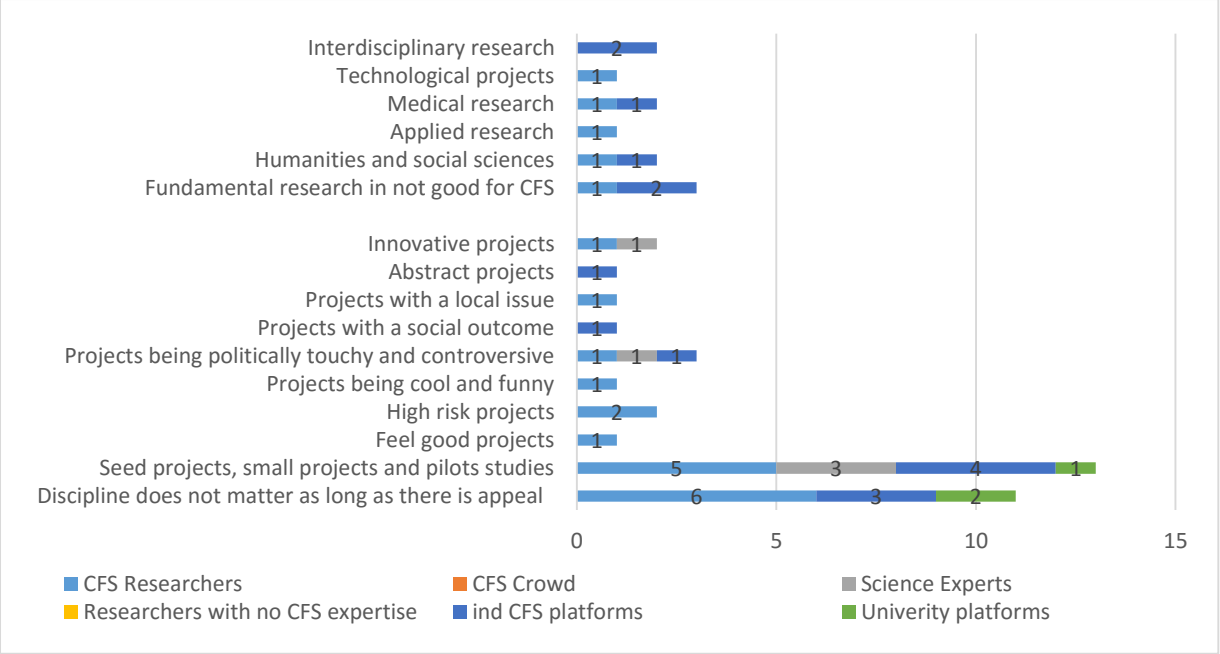
19Funding amount for CFS



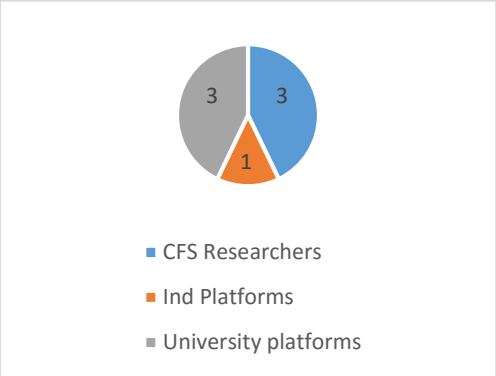
18 Network of researchers



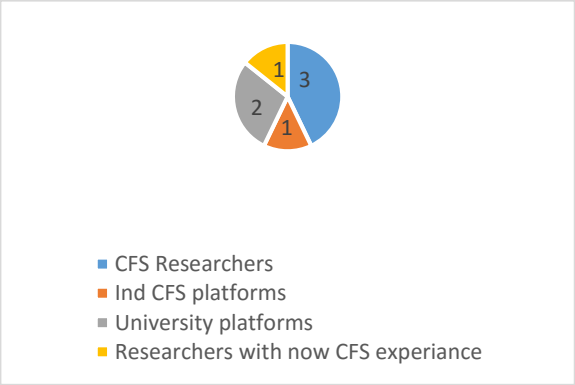
20 motivation of crowd-donors to participate in CFS



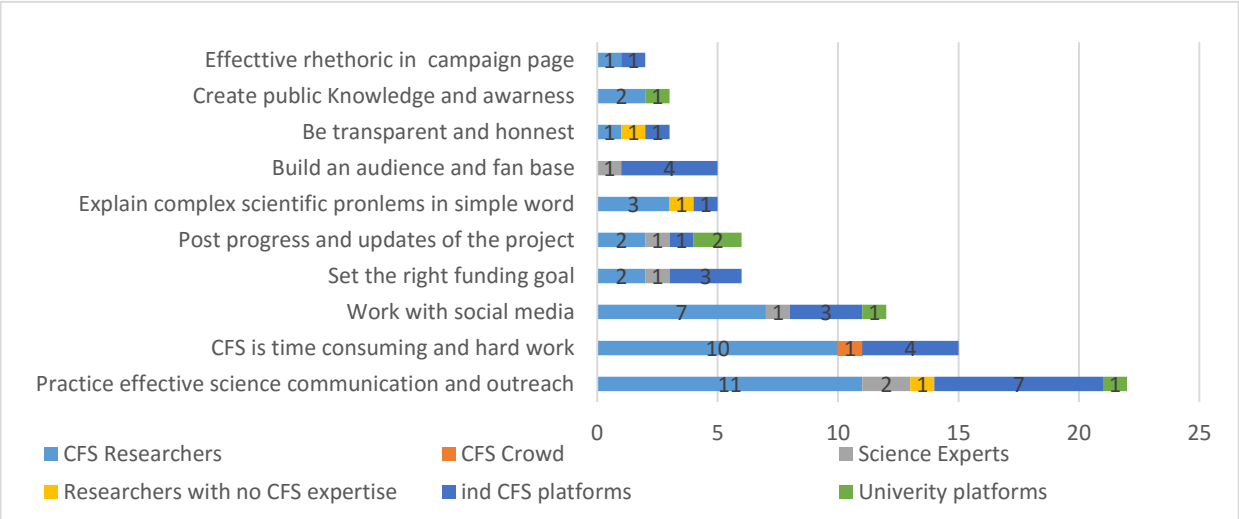
21 characteristics and attributes of projects that get crowdfunded



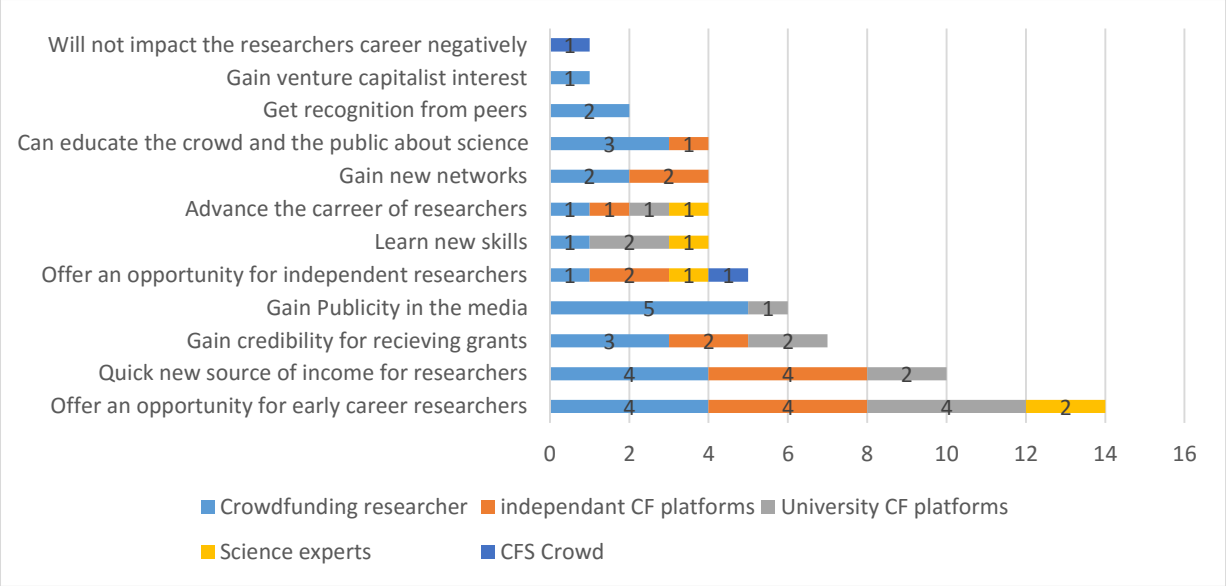
23The number of respondents believing that amount of help received from science platforms had an influence on funding



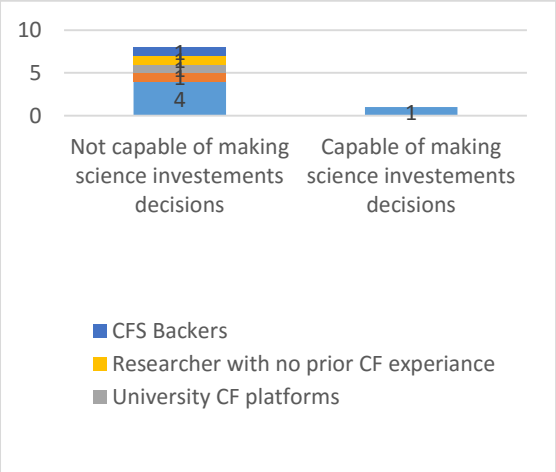
22 Number of respondents believing that there are no issue in regard to IP and taxation



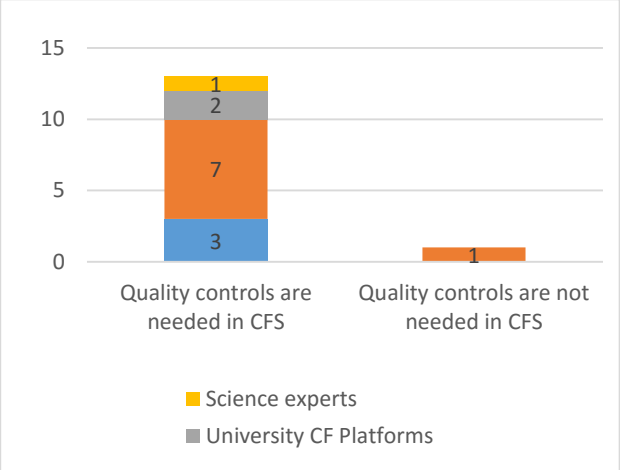
24 Skills and attributes of researchers



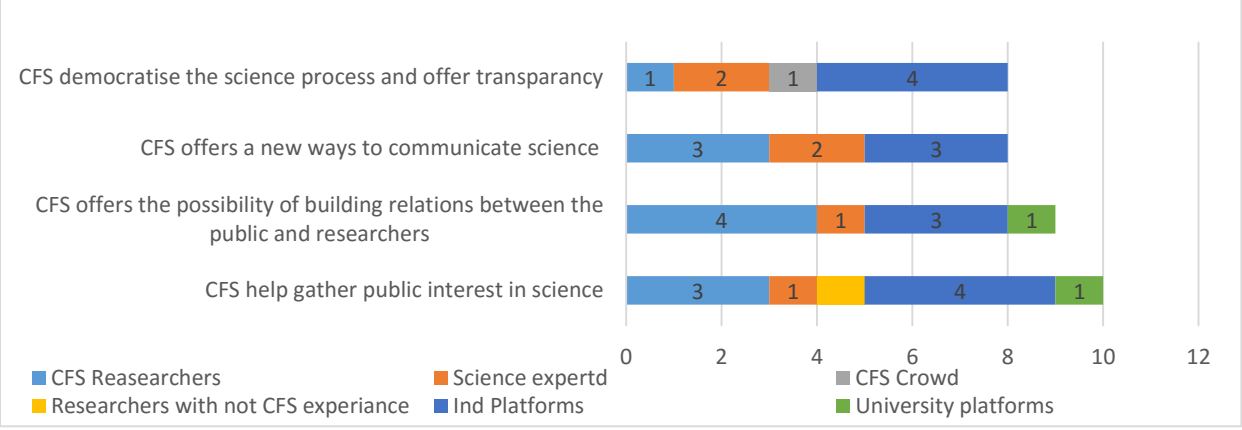
25 consequences for researchers



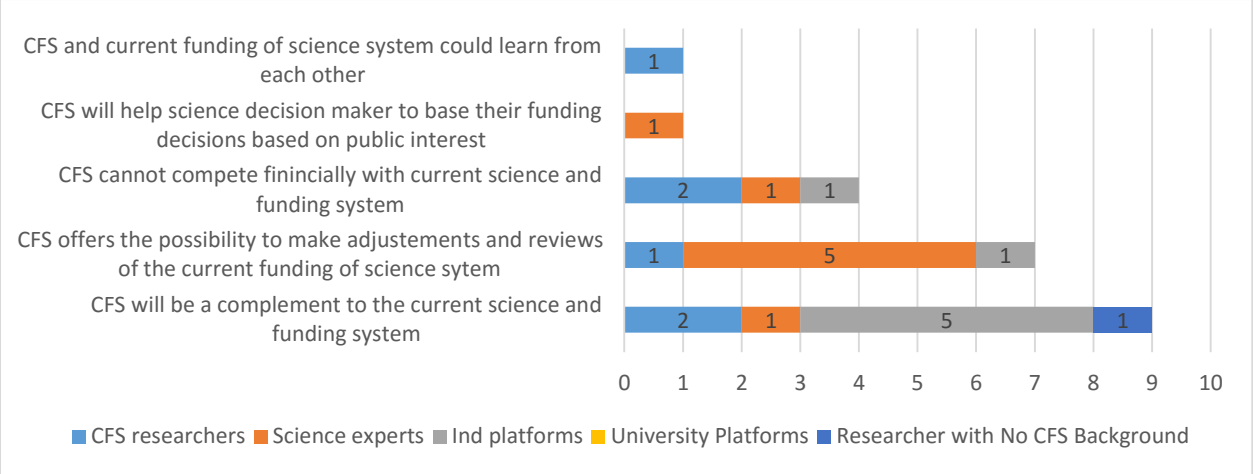
26 Crowds investment capabilities in science



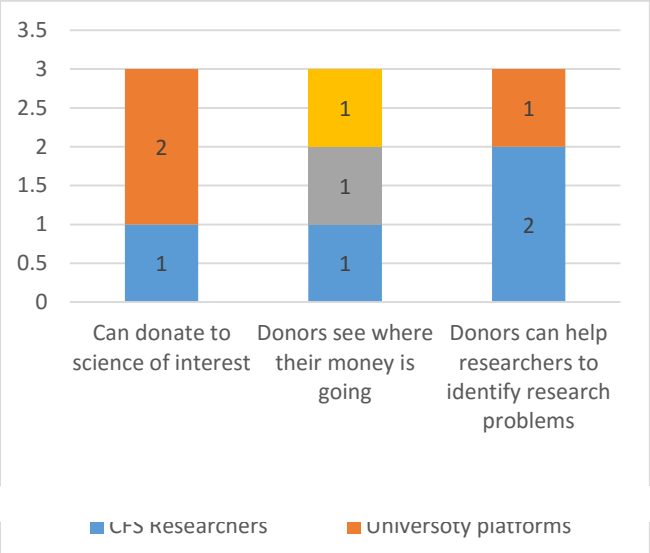
27 Number of respondents believing that quality controls are needed.



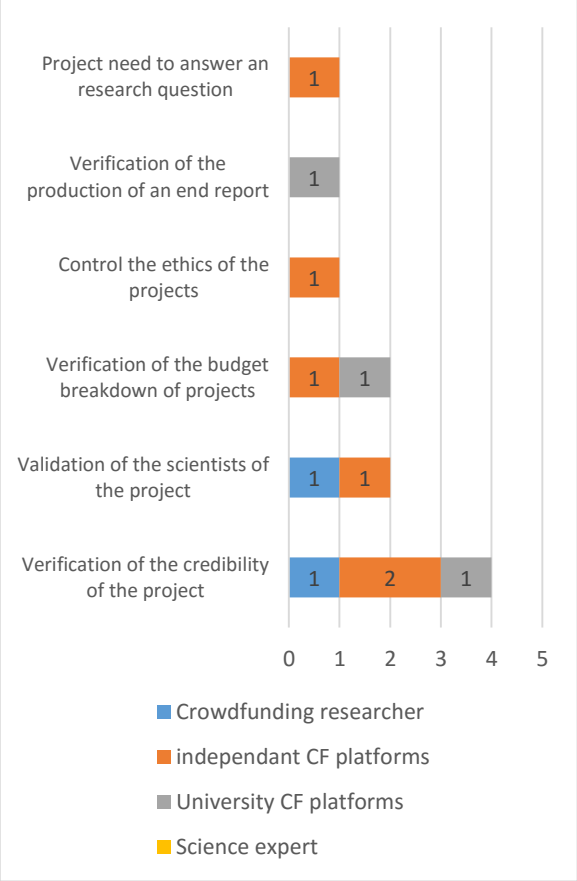
28 Consequence for the relationship between science community and the public



29 Consequence for research funding and public policies



30 Consequence for crowd-donors and the public



31Internal vetting process

8.3 interview guide

Antecedent for crowdfunding science

Crowdfunding Platform providers (experiment.com and university platforms)	**Crowdfunding Users (founders)**	**Crowdfunding Users (Donators)**
1) The crowdfunding mechanism for scientific projects ***Which factors do you believe influenced crowdfunding of science to emerge*** ***What do you think influences whether or not crowdfunding is a good mechanism for selecting and funding scientific projects?*** **Possible follow up questions** To what extent do you believe the crowd is suited for selecting qualified science project in crowdfunding? What do you think are factors that may or may not reduce the risk of making good or bad investment decisions in crowdfunded science? What do you think would influence whether or not a crowdfunding platform can select qualified project, setting quality standard and guarantee credibility?	***1) The crowdfunding mechanism for scientific projects*** ***Which factors do you believe influenced crowdfunding of science to emerge*** ***What do you think influences whether or not crowdfunding is a good mechanism for selecting and funding scientific projects?*** **Possible follow up questions** To what extent do you believe the crowd is suited for selecting qualified science project in crowdfunding? What do you think are factors that may or may not reduce the risk of making good or bad investment decisions in crowdfunded science? What do you think would influence whether or not a crowdfunding platform can select qualified project, setting quality standard and guarantee credibility?	***1)The crowdfunding mechanism for scientific projects*** ***Which factors do you believe influenced crowdfunding of science to emerge*** ***What do you think influences whether or not crowdfunding is a good mechanism for selecting and funding scientific projects?*** **Possible follow up questions** To what extent do you believe the crowd is suited for selecting qualified science project in crowdfunding? What do you think are factors that may or may not reduce the risk of making good or bad investment decisions in crowdfunded science? What do you think would influence whether or not a crowdfunding platform can select qualified project, setting quality standard and guarantee credibility?
2) Motivation and demographics characteristics of funders and users on crowdfunding platforms ***What factors motivated you to create and start a crowdfunding platform (at your University), (to collaborate with xxx platform)*** ***What do you believe motivate/ deter researchers for participating in, and adhering for funding via crowdfunding?*** ***What do you believe motivate/ deter the crowd / people for participating in and giving funding to research projects via crowdfunding?*** ***What kind of characteristics do you believe the crowd and scientist have, that are participating in crowdfunding?***	**2) Motivation and demographics characteristics of funders and users on crowdfunding platforms** ***What motivated you to participate in crowdfunding and what do you believe motivates / deter other researchers to participating in, and adhering for funding via crowdfunding?*** ***What do you believe motivate(d) the crowd for participating in your research and what do you believe influence other for participating in and giving funding to research via crowdfunding?*** ***What kind of characteristics do you believe the people have that are participating in crowdfunding of science?***	**2) Motivation and demographics characteristics of funders and users on crowdfunding platforms** ***What do you believe motivates / deter researchers for participating in, and adhering for funding via crowdfunding?*** ***What motivate(d) you to participate in crowdfunding and what do you believe influence other for participating in and giving funding to research via crowdfunding?*** ***What kind of characteristics do you believe the people have that are participating in crowdfunding of science?***

3) Specificity of crowdfunded science Projects, ***What factors do you believe will influence whether or not a scientific project will be successful in terms of funding and project completion via crowdfunding?*** *Possible Follow up questions;* Do you believe that the type of discipline influence whether or not a scientific project get funded and completed via crowdfunding? Do you believe that the characteristics of a project in term of funding amount, the duration and the reward of the campaign will influence whether or not a project get crowdfunded and completed? Do you believe a set of skills is required in order to get funding and getting a project completed and what do you believe these skills are? Do you believe copyright, legal and commercialisation possibility influences whether or not scientific project get Crowdfunded and completed via crowdfunding? Do you believe the type of market or the type of science platform or the funding model (all or nothing; all and more) will influence whether or not a project gets crowdfunded and completed via crowdfunding?	**3) Specificity of crowdfunded science Projects,** ***(From experience), What factors do you believe influence (d) whether or not a scientific project will be successful in terms of funding and project completion via crowdfunding?*** *Possible Follow up questions;* Do you believe that the type of discipline influence whether or not a scientific project get funded and completed via crowdfunding? Do you believe that the characteristics of a project in term of funding amount and the duration of the campaign will influence whether or not a project get crowdfunded and completed? Do you believe a set of skills is required in order to get funding and getting a project completed and what do you believe these skills are? Do you believe copyright, legal and commercialisation possibility influences whether or not scientific project get Crowdfunded and completed via crowdfunding? Do you believe the type of market or the type of science platform or the funding model (all or nothing; all and more) will influence whether or not a project gets crowdfunded and completed via crowdfunding?	**3) Specificity of crowdfunded science Projects,** ***What factors do you believe will influence whether or not a scientific project will be successful in terms of funding and project completion via crowdfunding?*** *Possible Follow up questions;* Do you believe that the type of discipline influence whether or not a scientific project get funded and completed via crowdfunding? Do you believe that the characteristics of a project in term of funding amount and the duration of the campaign will influence whether or not a project get crowdfunded and completed? Do you believe a set of skills is required in order to get funding and getting a project completed and what do you believe these skills are? Do you believe copyright, legal and commercialisation possibility influences whether or not scientific project get Crowdfunded and completed via crowdfunding? Do you believe the type of market or the type of science platform or the funding model (all or nothing; all and more) will influence whether or not a project gets crowdfunded and completed via crowdfunding?
4) Governmental, political legal and economic framework around crowdfunding of science ***How do you think political legal and economic factors influences positively or negatively the crowdfunding of science?*** ***Possible follow up questions*** *What do you think governmental and political bodies can do to surpass these challenges?*	***4) Governmental, political legal and economic framework around crowdfunding of science*** ***How do you think political legal and economic factors influences positively or negatively the crowdfunding of science?*** ***Possible follow up questions*** *What do you think governmental and political bodies can do to surpass these challenges?*	***4) Governmental, political legal and economic framework around crowdfunding of science*** ***How do you think political legal and economic factors influences positively or negatively the crowdfunding of science?*** ***Possible follow up questions*** *What do you think governmental and political bodies can do to surpass these challenges?*

Consequence of crowdfunding science

Crowdfunding Platform providers (experiment.com and university platforms)	Crowdfunding Users (founders)	Crowdfunding Users (Donators)

What do you think would be the consequences of crowdfunding science and What do you think would happen to the field of science when researchers and the crowd crowdfund science?	***What do you think would be the consequences of crowdfunding science and What do you think would happen to the field of science when researchers and the crowd crowdfund science?***	***What do you think would be the consequences of crowdfunding science and What do you think would happen to the field of science when researchers and the crowd crowdfund science?***
<u>Possible Follow-up questions</u> *To what extent do you believe crowdfunding of science will contribute to research in Europe / USA / Australia?* How do you think crowdfunding scientific project via crowdfunding will/ can / have influence(d) the career of researchers? What do you believe are the impact and relevance of a scientific project that has been funded and completed via crowdfunding? How do you believe Crowdfunding of science will influence research grant, research policies or university policies and in what way? How do you think Crowdfunding of science will influence the relationship between the scientific community and the public and in what way? How do you think crowdfunding of science platforms will evolve in the future?	<u>Possible Follow-up questions</u> *To what extent do you believe crowdfunding of science will contribute to research in Europe / USA / Australia?* How do you think crowdfunded scientific project will/ can / have influence(d) your career and the career of other researchers? What do you believe are / will be/ the impact and relevance of your crowdfunded project and the projects of other researchers that has been funded and completed via Crowdfunding? *How do you believe Crowdfunding of science will influence research grant, research policies or university policies and in what way?* *How do you think Crowdfunding of science will influence the relationship between the scientific community and the public and in what way?*	<u>Possible Follow-up questions</u> *To what extent do you believe crowdfunding of science will contribute to research in Europe / USA / Australia?* How do you think crowdfunded scientific project will/ can / have influence the career of researchers? What do you believe are the impact and relevance of a scientific project that has been funded and completed via crowdfunding? How do you believe Crowdfunding of science will influence research grant, research policies and in what way? How do you think Crowdfunding of science will influence the relationship between the scientific community and the public and in what way?

(table 31. Interview guide)