

When will scientists say yes? Antecedents, consequences and limitations of crowdfunding in research

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ABSTRACT

Crowdfunding in research refers to raising funds by scientists for various research related tasks using crowdfunding platforms. In spite of growing academic interest, there is still a lack of understanding of the various aspects of the above concept. In particular, identification of antecedents, consequences, and limitations is important in predicting future intentions of scientists in the context of crowdfunding in research. We conducted qualitative research using 40 free-form interviews with management academics representing a wide spectrum of positions at public and private universities in Poland. Based on that, we hereby provide a comprehensive framework that allows you to understand why scientists will potentially turn to crowdfunding in research and how they perceive the very concept. Our results show that crowdfunding in research can be encouraged by the following factors: gaining access to funding, legal regulations, replicating successful experience of others, the possibility of obtaining feedback from the public on their research, networking, acceptance of the scientific community, and scientific and social relevance idea. In addition to funding science, building confidence in science and solving social problems are the consequences of crowdfunding in research. In turn, the limitations of crowdfunding in research include the following: uncertainty of results, ostracism on the part of the scientific community, fear of loss of reputation and trust in science, and insufficient adjustment of existing crowdfunding platforms to the requirements of science.

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Introduction

Over the last decade, there has been steady growth in research into all types of crowdfunding in the scientific community (Baber and Fanea-Ivanovici 2022). Crowdfunding has been defined as 'an open call, essentially through the Internet, for the provision of financial resources either in form of donations or in exchange for some form of reward and / or voting rights in order to support initiatives for specific purposes' (Lambert and Schwienbacher 2010, p. 6). This growing interest in crowdfunding is due to its potential in terms of, among other things obtaining public opinion, securing public involvement in co-creation and verification of original ideas and business potential of an organization, increasing the legitimacy of an organization's entrepreneurial identity, and developing

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digital business models (Shneor, Zhao, and Flåten 2020; Vismara 2018, 2019; Walthoff-Borm, Vanacker, and Collewaert 2018).

Recently, it has been pointed out that researchers can also benefit from the potential of crowdfunding. Crowdfunding is recognized to be a part of the science ecosystem (Ikkatai and Ono 2018), a model for research (O'Donnell 2022), supporting scientific projects, public engagement with science (Hase et al. 2022), 'a new era for science communication' (Gür and Burak 2021, 57), and an emerging paradigm (Vachelard et al. 2016). In our article, we refer to crowdfunding used for supporting researchers' initiatives as 'crowdfunding in research'.

Despite the growing interest in crowdfunding in research, the literature points out that 'far-reaching hopes about crowdfunding's role in fostering public engagement with science seem somewhat premature' (Hase et al. 2022, p. 1006). It is highlighted that future research should involve the scientist's point of view (O'Donnell 2022). This is surprising, because the success of crowdfunding in research depends on the initiator (Zhang et al. 2019). Furthermore, 'future studies should extend the context of our findings by including further platforms and countries' (Hase et al., 2022, p. 1008). The findings obtained so far have their limitations, because they were conducted from the perspective of researchers who have already organized scientific crowdfunding initiatives (Hui and Gerber 2015). However, the process may be different for scientists who have already been involved in crowdfunding campaigns from those who have not (Ekpe et al. 2017). Moreover, future researchers are encouraged to conduct research into crowdfunding in research among scientists who have not attempted to launch such initiatives yet (Hui and Gerber 2015). Furthermore, researchers have recently called for more research into the antecedents, consequences and limitations of crowdfunding in research (Horta, Meoli, and Vismara 2022).

Therefore, this article aims at filling signalled gaps by identifying antecedents, consequences, and limitations from the perspective of management science researchers who have not resorted to crowdfunding in research. The indicated gaps give rise to the following research question (RQ):

RQ1. What are the antecedents, consequences and limitations of crowdfunding in research among management science researchers who have no experience in crowdfunding in research?

This article contributes to the literature in several ways. Firstly, the previous research on crowdfunding in research comes mostly from the English-speaking scientific world (e.g. Hui and Gerber 2015; Schäfer et al. 2018). In addition, they included researchers employed at universities in Malaysia (Lau and Chew 2022), Nigeria (Ekpe et al. 2017), Japan (Ikkatai, McKay, and Yokoyama 2018; Ikkatai and Ono 2018), Turkey (Gür and Burak 2021), Switzerland (Hase et al. 2022), and Australia (O'Donnell 2022). Additionally, recent findings by other researchers prompted us to reflect on what the perception of crowdfunding in research might be by scientists from a country where it is not embedded in any national fundraising jurisdictions (O'Donnell 2022). This is why, we conducted our research in Poland where crowdfunding in research is not legally sanctioned.

Secondly, additionally, previous studies emphasize that crowdfunding in research can spread more easily in the natural or medical sciences (Li and Pryer 2014), STEM (technology, engineering, and math) (Nwakpuda 2020) due to the specificity of scientific problems undertaken. On the other hand, crowdfunding in research can be difficult in the case of those sciences that are less spectacular and have a narrow, specialized scope, as in the case of social sciences, and more specifically, management science which is postulated for development (Sauer mann, Franzoni, and Shafi 2019). This is a reason for us to conduct research among representatives of management science.

Thirdly, the few studies conducted so far were mostly conducted among scientists who organized scientific crowdfunding campaigns (Gür and Burak 2021) or who knew the specifics of crowdfunding *per se*. There is one study that was conducted among scientists who had no experience with crowdfunding *per se* (Ekpe et al. 2017), but it was a survey method. This is a limitation because qualitative research is better for determining meaning, explaining phenomena, and advancing knowledge. Overall, our research answers the challenge to be faced while responding the call for better understanding who and why may potentially decide to use crowdfunding in research (Sauer mann,

Franzoni, and Shafi 2019). The strength of our study is that it provides a clear understanding of what researchers think about crowdfunding before they undertake it.

Fourthly, it is still postulated to recognize the perception of crowdfunding in research by scientists (Ikkatai and Ono 2018). Despite this, findings in this area are modest (Hui and Gerber 2015; Wheat et al. 2013). However, the academic degree held may differentiate the perception of crowdfunding in science (Hui and Gerber 2015). The existing literature findings are mostly limited to the opinions of scientists who are at the beginning of their scientific careers (Sauermaun, Franzoni, and Shafi 2019). In response to those shortcomings, some attention is paid to the perception of both researchers with less and more scientific experience.

Finally, we provide a comprehensive framework that consolidates antecedents, consequences, and limitations crowdfunding in research. It is necessary because 'crowdfunding is not a quick or short-term activity and it involves a process with multiple stages, requiring different activities and focus' (Shneor, Zhao, and Flåten 2020, 5). In developing our framework, our findings allow for understanding how crowdfunding in research is perceived and what will make it desirable for individual researchers (antecedents). We aim at recognizing the changes that occur in scientific work in connection with the acceptance or rejection of crowdfunding in research by researchers (consequences), and that are understood as a limiting condition or restrictive weakness. This is important for proposing potential solutions to motivate and support researchers (limitations).

Conceptual background

Crowdfunding in research

Crowdfunding in research is quickly emerging as a significant and valuable part of the financial landscape of higher education institutions (Hase et al. 2022). Crowdfunding in research is seen as a response to the inconvenience of limited access to funds by young scientists who do not yet have significant scientific achievements or who plan innovative research. It also fits in with the need for changes in research funding due to the ineffective allocation of funds, where the process of applying for grants is long and does not offer any guarantees of financing (Calyx 2022).

Previous research in crowdfunding in research has largely focused on its benefits for scientists, identifying ways to involve the community in funding research projects, methods of organizing crowdfunding campaigns, preferences of funders, identifying factors influencing the scientific success of crowdfunding in research projects (Schäfer et al. 2018), guidelines for researchers interested in using crowdfunding in research (Vachelard et al. 2016) and the perception of crowdfunding in research by members of society. Researchers also focused on identifying the reasons that lead academics to conduct research in crowdfunding (Le Pendeven, Bardou, and Manigart 2022).

Antecedents of crowdfunding in research

Few studies on the antecedents of crowdfunding in research show that the main reason for reaching for crowdfunding is due to a possibility to obtain funds faster (Wheat et al. 2013) than by means of traditional methods. It is attractive from the point of view of researchers starting their scientific career (Sauermaun, Franzoni, and Shafi 2019) and planning to implement innovative, less popular research problems. Additionally, researchers will be encouraged to refer to crowdfunding in science by replicating successful experiences of others, getting attention and feedback on their ideas, expanding awareness of work, gaining approval, and maintaining control (Hui and Gerber 2015).

The literature emphasizes that establishing cooperation is another reason for using crowdfunding (Hui and Gerber 2015). Additional incentives to reach for crowdfunding are the desire to meet other people interested in a similar topic, share data, experiences and ideas (Hui and Gerber 2015) and the possibility to learn something new (Calyx 2022), in particular gaining new fundraising skills (Hui and Gerber 2015).

Crowdfunding can change the way academic work is done by directly linking fundraising with the need to interact (Sauer mann, Franzoni, and Shafi 2019) and communicate with the wider community. In short, scientists reach for crowdfunding because they want to interact with the public and increase the transparency of the scientific process (Vachelard et al. 2016), which is part of social commitment (Schäfer et al. 2018). Another reason for using crowdfunding is the possibility of establishing cooperation with other researchers in the same field, facilitated by social influence and performance expectancy, subjective norms, and academics entrepreneurial orientation (Gür and Burak 2021).

Consequences of crowdfunding in research

So far, researchers have pointed to the fact that crowdfunding in research allows scientists to meet people interested in the same topic and interact with the broadly understood public opinion (Vachelard et al. 2016). Thanks to this, it is possible not only to increase the transparency of the scientific process (Hui and Gerber 2015), but scientists receive public support and confirmation that their ideas respond to the current needs of society and reflect what society care about. Crowdfunding in research is often understood as a channel of communication between scientists and members of society, thanks to which researchers can become popularisers of science (Byrnes et al. 2014). In addition, members of the public interacting with scientists can access preliminary research results or other research materials (Hui and Gerber 2015) in the form of accessible videos and blog posts, not journal articles or presentations at scientific conferences. In particular, crowdfunding in research is an alternative fundraising mechanism for the implementation of pilot or high-risk projects and thematically attractive to the society (Byrnes et al. 2014).

Limitations of crowdfunding in research

Early research on crowdfunding in research indicates that it raises concerns among academics as a time-consuming and preparation-intensive endeavour (O'Donnell 2022) in terms of accessible project presentation, communicating with Internet users and its potential significance of the results project for science and members of society. Others point to concerns about the risk of failure, which scientists believe may result from their inability to attract followers (Hui and Gerber 2015). The discomfort of self-promotion and asking for money, which the university should provide, is also important.

Literature also indicates the feeling of scientists that crowdfunding in research is not scientific in nature, and thus they fear that they will lose their reputation in the scientific community (Hui and Gerber 2015). The following limitations are also highlighted in the literature: institutional bureaucracy requiring scientists to consent to crowdfunding in research, the risk of ideas getting stolen, accusations that scientists are over-demanding or that they are required to market their own science. Some pointed to the maladjustment of existing crowdsourcing platforms to the specificity of scientific projects, the lack of university infrastructure supporting crowdfunding in research, and legal and tax regulations (Hui and Gerber 2015).

Methodology

Our research focuses on identifying antecedents, consequences, and limitations from the perspective of management scientists who have not used crowdfunding in research so far. Due to the desire to obtain opinions and beliefs and capture the perception of crowdfunding in research by scientists – our study uses a qualitative approach. Such research is important for two reasons. Firstly, qualitative research methods allow for an in-depth insight into a given phenomenon, thanks to which it is possible to explain the phenomenon in question. Secondly, due to the specificity of crowdfunding, qualitative research is recommended in the literature (Hui and Gerber 2015).

Empirical settings and a sample

To understand the full range of antecedents, consequences, and limitations, we chose deliberate non-random sampling. We strived for the heterogeneity of the interlocutors, which is why we invited representatives of all academic ranks including representatives of the following positions: Instructor, Assistant Professor, Associate Professor, and Full Professor. There were 40 scientists involved in total, 10 in each academic ranks, which is in line with the recommended limit for reaching closure. When selecting the interlocutors, we were guided by the following criteria: (1) scientists carrying out research projects from external funds, (2) employment in both smaller and larger research centres, (3) conducting research with the use of modern IT solutions, (4) diversity of gender, age, and position.

In the period March-May 2022, we conducted free-form interviews using the list of sought information. All interviews were conducted personally by one researcher. Before starting the actual research as part of the researchers' triangulation, one of the researchers developed a preliminary list of questions, and then three researchers verified the correctness and relevance of the developed questions. Overall, as part of our main research, we asked interlocutors to answer the following questions:

- (1) How do you understand the concept of 'crowdfunding in research'?
- (2) How do you perceive crowdfunding in research, what might it mean for scientists?
- (3) What would encourage organization of the crowdfunding in research initiative?
- (4) What may be the limitations that discourage reaching for crowdfunding in research?

Due to the limitations of social interaction and travel due to the COVID-19 pandemic, the research was online, and it was conducted using the Microsoft Teams application. The interviews lasted on average 40 min: the longest was 1 h and 45 min and the shortest 20 min. Their length depended on the openness of the interlocutors/ respondents.

Data analysis

All interviews were taped with the informed consent of the respondents and then they were transcribed. In total, the transcripts of the interviews were 427 pages long, and the interlocutors were coded with the letter S (scientists, S1 to S40). Due to the fact that the use of data coding software depends on the preferences of the researcher, we decided that this process would be performed on a 'paper-and-pencil' basis, without software support. We agree that available data analysis software does not provide certainty as to the correctness of the results obtained (Nowell et al. 2017).

We decided to analyse the data using some thematic analysis because we wanted to identify patterns in the perceptions of participants. Our data analysis is based on a hybrid approach, which is one of the most frequently recommended approaches to thematic analysis to qualitative research (Braun and Clarke 2006). Following the trustworthiness criteria (Nowell et al. 2017), we provided triangulation of data sources as an increase in the completeness of the obtained view on crowdfunding in research.

Bearing in mind the guidelines in the field of thematic analysis, we first created superior codes derived from the literature on crowdfunding in research (deductive coding). After generating the codes based on theory, we moved on to coding the data collected in the course of the conducted research. Reading line by line, the raw data was reduced to smaller units and a search for master codes. For this purpose, we compiled an initial list of codes for further review and correction. Subsequently, the themes emerging from our data and previous research were analysed and discussed by us and collated with the relevant literature. This allowed for the emergence of general categories taking into account topics related to antecedents, consequences, and limitations of crowdfunding in

research. For the purposes of reporting the results obtained, we selected quotes dominant in transcripts and key to our categories.

Findings

Our qualitative research allowed us to provide antecedents, consequences, and limitations of crowdfunding in research from the perspective of management science representatives who did not undertake crowdfunding initiatives.

Antecedents of crowdfunding in research

The research we conducted allowed us to find factors that triggered crowdfunding in research. For the transparency of their reporting, we divided them into the following categories: external and internal.

External antecedents of crowdfunding in research

As the results of our research show, many factors can trigger crowdfunding in research. However, in relation to researchers with less scientific experience, it is the only (the most important) reason to reach for crowdfunding in research was the inability to obtain funding for research in a traditional way: 'I would probably not have obtained other sources of funding' (S1). As one of our interlocutors with less scientific experience points out, this is due to the difficulties in accessing funds from financing institutions: 'applying for grants requires grant achievements, which we young people do not have' (S5). Moreover, the speed of obtaining funds is becoming more and more important: 'the process of receiving money from the university is quite time-consuming (...) in crowdfunding it seems faster' (S11). On the other hand, for researchers with more scientific experience, the emergence of crowdfunding in research related legal regulations at the university and on the national level may be an incentive to reach for crowdfunding in research: 'I just don't know what it is like from the point of view of legal solutions' (S15).

Organizational support was also important to our interlocutors with more scientific experience in the form of establishing the compliance of crowdfunding in research with the applicable law: 'I would have to (...) have an opinion from lawyers that my offer and the further procedure are absolutely legal, and no one will ever accuse me, I don't know, of embezzling any funds' (S40). As compared to legal support, technical support is also very important: 'if it wasn't me who had to be there, during that study (...) I could be there, let's say, a grey eminence or somewhere behind as a co-author' (S20, researcher with more scientific experience).

Internal antecedents of crowdfunding in research

As we indicated, researchers with less scientific experience did not point to internal antecedents. They were relevant to researchers with more scientific experience. One of the factors to be taken into account referred to gaining public interest in the scientific project: 'it is also a potentially interesting group of people to cooperate with' (S39, researcher with more scientific experience). In addition to cooperation, the respondents with more scientific experience indicated obtaining feedback as another factor determining the possibility of reaching for crowdfunding in research: 'a little verification by the environment (...) of this idea, whether anyone is interested in it at all' (S40).

Replicating successful experiences of others was indicated by our interlocutors with more scientific experience as the reason for reaching for crowdfunding in research: 'if I saw that someone already had projects, and if they were actually successful, then, that would really encourage me' (S39). For many interlocutors with more scientific experience, significant reasons for using crowdfunding in research refer to the belief in the attractiveness of research: 'probably when I knew

that I had a (note: super) research plan and I had nothing to finance it with' (S34) and recognition of innovation the idea: 'if I ever come up with an idea that I will believe is so great and so incomprehensible' (S29).

Certainty about quality and safety is another reason for using crowdfunding in research: 'I should also see security issues here, related to the protection of property' (S23, researcher with more scientific experience). Finally, desperation was another named factor: 'some kind of desperation' (S36, researcher with more scientific experience).

Consequences of crowdfunding in research

Our research allowed us to recognize the perceived results of crowdfunding in research. For the transparency of their reporting, we organized them into the following categories: economic, scientific, and social. However, in our research we did not identify relational consequences, as indicated in the literature (e.g. Vachelard et al. 2016).

Economic consequences

Economic consequences were pointed out by both researchers with less and more experience. Those less experienced pointed out that the main benefit of crowdfunding in research referred access and the possibility of obtaining funds for research. They considered it to be 'a new way to raise money and perhaps also a future for obtaining research funding' (S1). Additionally, they claim that crowdfunding in research provides access to research funding for young scientists who are just starting their scientific careers and building their scientific achievements: 'for them it may even be such a much easier way that they seem to have a goal, if someone is primarily guided by a goal, it could be the easier one' (S11). What is more, more experienced researchers highlighted raising funds for research devoted to socially important 'topics that could meet with public reception, willing or open (...) it may be some attractive a path for such marginal research and experimental teams' (S37).

Scientific consequences

Scientific consequences were pointed out by both researchers with less and more experience. In crowdfunding in research, it is the members of the public who are the verifiers and reviewers of the project applying for funding: 'those who pay in money are not the automatic beneficiaries of it, they just agree that the idea is good, and it is worth supporting' (S38). In a word, a scientist can find out if his project makes sense because it is verified by his potential recipients: 'there is some element of some public review showing if I could really convince people' (S20). According to our interlocutors with less scientific experience, crowdfunding in research is connected with building trust in science: 'how do people perceive scientists in general, because if they see any sense in science and in spending money on research, they will support such actions' (S7).

Social consequences

Both less and more scientifically experienced researchers decided that crowdfunding in research projects allowed scientists to provide practical solutions useful to society: 'something that society needs' (S13). In turn, only scientists with more scientific experience believe that crowdfunding in research allows for presenting scientific problems and research results to a wider audience: 'public relations for science (...) breaking the stereotypes of a typical professor a bit' (S39).

Limitations of crowdfunding in research

Our research allowed us for identifying the limitations of crowdfunding in research. For the transparency of their reporting, we organized them into the following categories: personal, scientific, and technical.

Personal limitations

With regard to limitations at the personal level, the overwhelming majority of researchers with more scientific experience point to numerous limitations. One of our respondents points to the pejorative perception of a university whose scientist is 'forced' to reach for crowdfunding in research: 'if a researcher asks for money to translate their book (...) I am very sorry that his institution does not support them (...)' (S30). An associate professor from one of the public economic universities shared the above concerns and considers some pejorative perception of crowdfunding in research to be justified: 'Ostracism is justified' (S29).

What connects younger and older researchers with scientific experience is the reluctance of society to learn: 'the loss of trust in science may translate into a lower willingness to provide support' (S7). Some of the scientists who were more scientifically experienced emphasized that crowdfunding in research could mean that methodological rigour is of marginal importance: 'I see certain (...) threats that people who do not conduct comprehensive research may apply for funds' (S26).

Scientific limitations

One of the limitations pointed out by researchers with less experience was a loss of society's trust in science: 'I am afraid that if we let it go, the trust in science in society could drop even more' (S8). One of the interlocutors emphasizes that there may be some conviction among the public that they pay taxes so why they are still expected to support the researcher by means of crowdfunding: 'I heard that some person tried that and was confronted with enormous hatred from Internet users (...) he was called names including beggar, scammer, and so on' (S17). Research has shown that respondents perceive crowdfunding in research as an activity that requires commitment and does not guarantee funding. This is reported by one of our interlocutors, an instructor employed at one of the public universities: 'always quite a lottery' (S10).

In turn, one of the more experienced scientific researchers involved stated that in principle, large financial resources were not needed to conduct research in management science, hence crowdfunding in research could possibly turn out to be unnecessary: 'after all, a lot of research can be done at no cost, it is more often a matter of an idea, not money' (S24). Difficulties related to providing a practical solution useful to the public were also signalled: 'after all, we have different expectations' (S14).

Institutional limitations

While scientists with less scientific experience do not point to institutional limitations, researchers with more experience emphasize the importance of regulations within universities. One researcher with more scientific experience points out, in particular, to the issue of intellectual property: 'The following question may be asked: who owns the result? (...) this would require some regulation' (R34).

Technical limitations

Technical limitations are indicated only by researchers with less scientific experience: in particular those related to insufficient adaptation of existing platforms to the specificity of creating scientific knowledge: 'the websites function, but their purpose is slightly different' (S3). In addition, according

to the interlocutors, such a platform should be endorsed or recommended by a government administration office or a government grant agency: 'it could operate under the auspices of [name of the grant agency]' (S3).

Discussion and conclusion

The aim of this article is to identify antecedents, consequences, and limitations of crowdfunding in research from the perspective of management in science scientists who have no experience in crowdfunding in research. This recognition is a response to the calls of the literature (Sauermann, Franzoni, and Shafi 2019), as factors may vary depending on the experience of scientists (O'Donnell 2022). While the research to date has been conducted in countries where crowdfunding in research is legally and culturally regulated, this is our study that fills the gap, recognizes the perceptions of scientists from a country where crowdfunding in research is not legally regulated. In addition, our findings complement the current state of knowledge by providing some perception of crowdfunding in research researchers with less and more scientific experience that is understood as a position at the university.

Firstly, the antecedents of crowdfunding in research we identified were divided into two categories: internal and external. Regarding the internal ones, our findings confirm the existing knowledge that the lack or difficult access to financial resources is one of the main reasons why scientists use crowdfunding in research (Hui and Gerber 2015). In particular, this is indicated by scientists with less scientific experience, which was consistent with previous findings (Wheat et al. 2013). The interviews revealed two additional factors that were not identified in the literature but were relevant only to researchers with more scientific experience: legal regulations at the national level, and legal organizational support. This, in fact, is not surprising. In recent years, fraud and other incidents in the field of academic research have been observed along with violation of academic norms and ethics, which could inevitably lead to a loss of public confidence in scientists. It is not surprising, then, that scientists could conclude that crowdfunding in research is strongly related to the guarantee of scientific transparency and clarity. Besides, crowdfunding in research is like a project, which means that it requires specific preparation of the initiator. This is also repeatedly emphasized in the literature, and numerous guides and guidelines on crowdfunding in research are proposed (Vachelard et al. 2016). Our research has shown that organizational support is essential for the willingness to reach for crowdfunding in research.

According to our researchers, external antecedents of crowdfunding in research were relevant only to researchers with more scientific experience. The identified antecedents were consistent with the findings of other researchers (Gür and Burak 2021). Moreover, both the literature and our research emphasize that replicating successful experiences of others are important for scientists in crowdfunding in research, willingness to obtain feedback on a scientific idea, to meet people interested in a given topic (Hui and Gerber 2015) and building trust in science (Vachelard et al. 2016). Our findings show that scientists will use crowdfunding in research because they know people interested in a given issue, which is consistent with the findings so far (Hui and Gerber 2015).

In addition, previous research established that social influence, performance expectancy, academics entrepreneurial orientation (Gür and Burak 2021) were the antecedents of crowdfunding in research. Our interviews did not reveal this. In addition, our interlocutors did not point to other factors found in the literature, such as: need to interact, communicate, increase the transparency of the scientific process, collaborate with the same field, inform about planned research, educate the public, build confidence in science, share data, experiences and ideas, learn something new, including fundraising skills (Byrnes et al. 2014). The listed factors refer to those that can only be recognized when a scientist begins their adventure with crowdfunding in research. This is confirmed by the findings of Hui and Gerber (2015) who state that the perception of crowdfunding in research changes over time and varies depending on the intensity of crowdfunding. In addition, our findings allowed us to identify three factors that had not been previously reported in the

literature: (1) the universality and acceptability in the scientific community, (2) the confidence in the quality and safety, and (3) desperation and finality. Especially, be willing to use crowdfunding in research to obtain acceptance from the scientific community and perceived subjective norms that refer to the belief that an important (from the point of view of a given individual) person or group of people will approve and support a given behaviour. This leads to an increase in motivation and the willingness to conform to the views, opinions or judgments of others. More specifically, despite the availability of crowdfunding in research, scientists hesitate to reach for it, which results from the subjective belief that the scientific community is reluctant to accept people who use crowdfunding in research. Our discovery strengthens and complements the existing literature (Hui and Gerber 2015).

Secondly, as previously agreed, crowdfunding in research has several consequences for scientists. Our interlocutors pointed to factors consistent with previous findings of other researchers, including in particular the following: scientific (Saueremann, Franzoni, and Shafi 2019), economic, and social (Byrnes et al. 2014). However, they did not indicate the relational factors indicated in the literature (Byrnes et al. 2014), which is also not surprising. Relational factors are strongly connected with the implementation of a crowdfunding initiative. Our findings confirm that scientists using crowdfunding in research not only gain the opportunity to obtain funds, but also share their knowledge with the public, thanks to which they gain the legitimacy of scientific discourse, and reviewers of the project applying for funding support for their scientific work and research. Building confidence in science is also important. In this approach, the consequence of building trust in science indicated by our respondents / interlocutors is consistent with the previous findings of other researchers (Byrnes et al. 2014). Our interviews revealed additional factors that had not been identified by other researchers. However, they were indicated by our interlocutors with more scientific experience: a solution in the event of a biased redistribution of funds, verification of the project by crowd, presenting scientific problems and research results to a wider audience, and making scientific knowledge available to a wider. The indication of redistribution of funds is not surprising, because it results primarily from scientific experience and attempts to obtain funds for research through funding institutions (Byrnes et al. 2014). In turn, the perceived results related to the popularization of knowledge and verification of projects by Internet users are in line with the expectations of scientists related to inclusivity and the third mission of the university (Osimo, Priego, and Vuorikari 2017). This issue was also raised by our interlocutors – scientists with less scientific experience.

Thirdly, the literature, but also the results of our research, indicate numerous limitations of crowdfunding in research. Previous studies found constraints such as the discomfort of asking for money, having self-promotion, and the fear of universalism (Hui and Gerber 2015). Our findings do not confirm this. Our research shows that the limitations include the following: perceived reluctance of society to learn, negative perception by the society and the scientific community, uncertainty as to the suitability of the idea for obtaining funds for the implementation of research tasks. These observations are consistent with the findings of Hui and Gerber (2015), who precisely indicate the uncertainty of risk and the uncertainty related to whether a given idea for an initiative will find interest and support among donors. However, our respondents/interlocutors did not point to the fact that crowdfunding in research is, in their opinion, time-consuming and requires preparation. The literature shows that crowdfunding in research is connected with the scientist being the spokesman of their own ideas (Hui and Gerber 2015). Moreover, it was not observed that crowdfunding in research requires a scientist to meet the requirements set by universities, as indicated in the literature. Our findings do not confirm that the limitation of using crowdfunding in research is the scientists' fear of the possibility of stealing ideas.

Based on our findings, we provide a comprehensive model of crowdfunding in research that takes into account antecedents, consequences, and limitations. Thanks to this, we can understand the perception of crowdfunding in research by scientists-representatives of the management scene who did not use it (Figure 1).

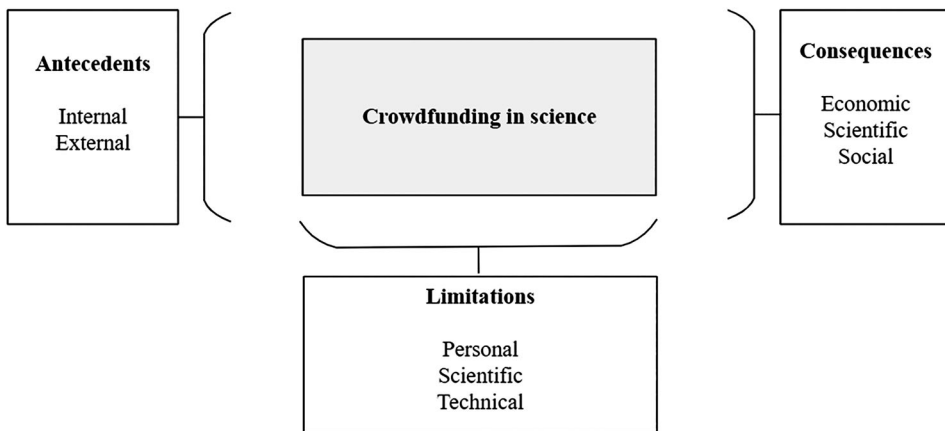


Figure 1. Comprehensive framework for crowdfunding in research. Source: own elaboration.

Implications for management theory

Our research responds to a recent call for more research into scientists' understanding of crowdfunding in research, and integrates antecedents, consequences, and limitations of crowdfunding in research. Firstly, we extend the existing analyses to include the perspective of management science scientists who have never practiced crowdfunding in research. Recent studies have looked at antecedents, consequences, and limitations of crowdfunding in research from the point of view of scientists who have launched such an initiative at least once (O'Donnell 2022).

Secondly, our study not only recognizes, but also categorizes the identified factors that are important from the point of view of management science scientists who have not implemented any scientific crowdfunding initiative. Regarding antecedents, we have categorized them into internal and external. We have categorized the consequences into economic, relational, scientific, and social. Finally, we have categorized limitations into institutional, resource, scientific, personal and technical constraints. Based on this, we have provided a comprehensive framework to understand how crowdfunding in research is perceived, why scientists may use it, and how scientists build a perception of the consequences and limitations of crowdfunding in research.

Implications for management practitioners

The antecedents, consequences, and limitations we identified are useful for proposing recommendations to practitioners. We also see their usefulness in developing policies encouraging crowdfunding in research by management science scientists who do not practice this form of financing, coming from countries that have not regulated it yet. We believe that with appropriate institutional, legal and technical support, all scientists can apply for additional funding.

Reaching for crowdfunding in research should be regulated not only by universities, but also at the national level. Due to the lack of legal and tax regulations, crowdfunding in research is perceived as unacceptable by both the society and the scientific community. This remark also applies to the maladjustment of current crowdfunding platforms to the needs of scientists. Perhaps it may be helpful to provide a national crowdfunding platform dedicated to research initiatives. The role of an operator could be undertaken by a governmental or other legislator-supported agency.

However, apart from the support in the field of infrastructure, it is important to convince academics about the legitimacy and usefulness of crowdfunding in research. The support and commitment of the higher education institution employing the research worker is essential to overcome internal resistance to crowdfunding in research by providing knowledge and skills in this field. It is not enough to provide knowledge about what crowdfunding in research is. Benefits and

limitations involved should also be studied. It is important to show good practices and publicize that researchers from other prestigious universities who decide to employ crowdfunding in research.

Limitations and directions of future research

Our research is not free from limitations, which encourages further research. The first, but also the main limitation referred to the qualitative nature of the research project. Despite the triangulation, the interpretation of the obtained data may be influenced by the subjectivity of the researcher. While the choice of qualitative research was dictated by the early stage of the development of crowdfunding in research, quantitative research will help identify the importance of the most important antecedents, consequences, and limitations of crowdfunding in research for the future intentions and behaviour of scientists. Next, we conducted our research on a deliberately selected sample of scientists who did not practice crowdfunding in research. We did not include doctoral students in our research. However, given the dynamics of the development of crowdfunding in research, their opinion may be important. Therefore, future research should also include this group. In addition, future research should take into account gender of the interlocutor in the analysis and interpretation of the results. Some scholars believe that women are more likely to succeed in crowdfunding in research initiatives (Sauermaun, Franzoni, and Shafi 2019).

We emphasize that antecedents, perceived consequences, and limitations may change over time, in particular in the organized first scientific crowdfunding initiative. Therefore, future research should be longitudinal. The research was conducted in a country where crowdfunding in research is not legally regulated. It is therefore worthwhile, for comparison, to conduct research among researchers who have not practiced crowdfunding in research but come from a country where it is legally regulated. It is important because each country has a different system of financing science. Therefore, we suggest that future research should investigate crowdfunding in research in a variety of other contexts and university settings.

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