

Online Crowdfunding as Academic Grants: A Systematic Literature Review

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Abstract—Funding is one of the main factors for academic researchers to achieve success throughout their academic career. The traditional method of requesting research grants from corporations (through research and development departments) and government (primarily carried out through universities and specialized government agencies) takes a long time to process, and in addition, the competition is fierce. The review is carried out by performing a systematic literature review in order to identify and discover what and how online crowdfunding is being used, and, to recognize its role in any kind of academic grants. Several research questions are designed and multiple of research papers and studies are collected and analyzed. The data collected from the studies were then used to answer the research questions. The findings include, the types of crowdfunding models, advantages and disadvantages of crowdfunding for the research domains, crowdfunding platform evaluation and the crowdfunding scenes in Malaysia. With this review, the data collected and answers from the questions could provide insights into crowdfunding as an alternative for academic grants funding in Malaysia, other than the conventional methods.

Index Terms—Academic Research; Crowdfunding; Funding; Malaysia.

I. INTRODUCTION

Funding is one of the main factors for academic researchers to achieve success throughout their academic career. Usually academic funding will receive their funding from the government and industrial sectors. The situation in Malaysia is no different from other countries that value research activities. Any researchers or students who require funding for their research must go through several processes before the government or authorities approve their requests. Based on this, there are many alternatives that may help to solve this problem. One of these alternatives is by using crowdfunding.

Crowdfunding is one of the modern ways of collecting funds for businesses and projects. This method is popular in Europe and started to make way in other region as it is practical and effective way for collecting funds. Crowdfunding is a practice of funding a new project or venture by raising monetary contributions from a large number of people [1].

In the United States (US), there are many crowdfunding platforms that are available to the public to start their own project. They will try to present their project proposal in the most creative way to appeal the online community to donate. For academic research, there are small numbers of universities that provide a crowdfunding platform for their researcher or student to obtain fund for their research. This method is very effective and faster than the conventional

method which is very time consuming.

The purpose of this study is to identify and investigate what exactly is crowdfunding and the types of framework and model of crowdfunding available nowadays. We concentrate on crowdfunding related articles which are published from year 2011 until 2016. The methodology will be described in section III and the results will be in section IV. In section V, the major research questions will be answered based on our findings and finally the conclusion will be presented in section VI.

II. RELATED WORKS

Many universities nowadays are beginning to realize the importance of academic research and its academic value to the university. But globally, the academic research funding is getting reduced and competitive and research universities have been affected because of this drastic curtailment. In Malaysia, most of the academic research are totally funded by the traditional funding sources, for examples the government and funding institution [2]. The time taken for a research grant to be approved is too long and the researchers mostly spend most of their time doing the paperwork for applying the funding than doing their research.

Because of the above problems, crowdfunding emerges as one of the alternative that could be used to fund academic researches. There are many types of crowdfunding, thus research need to be done in order to appoint the most suitable type for funding academic research purpose. Crowdfunding is considering a new alternative to collecting funds and the first online crowdfunded project were in year 1997 in the US while for the asia crowdfunding scene, DemoHour is the first ‘kickstarter’ like crowdfunding platform launched in China in 2011 [3]. For Malaysia, in 2015, the Securities Commission Malaysia (SCM) has announced approvals for six equity crowdfunding platforms and it became the first step to introduce crowdfunding concept to the Malaysian community [3].

To apply the crowdfunding concept to academic research purposes, a thorough study needs to be done to find a suitable crowdfunding model and to identify the criteria or features that serve the academic research scene in Malaysian’s universities. For the US and Europe, many researchers already try to make use of the crowdfunding platform to not only fund their research but to publicized it [4]. In Malaysia, the crowdfunding method is still considered new and many people have not yet exposed to this concept. There are several deterrents and challenges to propose crowdfunding concept to the Malaysian community and proper strategies and plans need to be constructed.

III. LITERATURE REVIEW

The review of crowdfunding was conducted as a systematic literature review. We used the standard systematic literature review method by employing manual search of 32 journals and articles. In this review, the main goal is to collect a valid data that could be used for future research on crowdfunding and its exposure in Malaysia. The steps taken for this systematic literature review method are documented below and was referred to the work from.

A. Research Questions

The research questions that addressed by this study are:

RQ 1. What are the types of current online crowdfunding?

RQ 1.1 Are they any specific types of online crowdfunding for research purposes?

RQ 2. What are the motivation factors to the success of online crowdfunding project?

RQ 2.1 What are the advantages of online crowdfunding for research projects?

RQ 3. What are the hindrances that will affect online crowdfunding project to be successful?

RQ 3.1 What are the restraints for the researcher to online crowdfund a research project?

RQ 4. How to evaluate the effectiveness of online crowdfunding?

RQ 5. What is the online crowdfunding scene in Southeast Asia, especially Malaysia?

This review will first look into what defines an online crowdfunding. Crowdfunding is still in infancy and still in a process to be introduced worldwide. Many experts in developing and emerging markets in Southeast Asia including Malaysia have been considering crowdfunding as a developed-world initiative and project.

With respect to RQ1, after learning the definition of the crowdfunding, we would try to discover and categorize the types of crowdfunding available. As we know, crowdfunding is an emerging and quite popular alternative for project or business creator, they have their own understanding and definition of crowdfunding framework that are suitable for various types of project. We will identify and review the types of crowdfunding framework and model that are available and popular among the crowdfunding community.

We investigate the motivation factors to the success of crowdfunding projects in RQ2. The motivation factors include the advantages of crowdfunding and what influence the users to choose crowdfunding compare to the traditional medium for collecting funds. Based on this finding, we could determine the best criteria for a crowdfunding platform for research projects.

We also try to study the hindrance that could prevent a crowdfunding project to be successful. This is addressed in RQ3. It is important to know the hindrance so we try to avoid doing the same mistake that could ruin the crowdfunding projects.

It is also important to know how to measure the success of a crowdfunding projects. By asking this question as per RQ4, we would be able to learn the criteria or parameters that are taken into consideration when measuring the effectiveness of the crowdfunding, and how.

Crowdfunding is still new to the Southeast Asia region. To understand the depth of comprehension to crowdfunding methods in the Southeast Asia region especially Malaysia,

RQ5 is posed, to study on research papers that related to crowdfunding in Asia.

B. Search Process

The search process was done manually and carefully to find out all the research papers and relevant studies about this topic. All the research papers are chosen from major indexing databases that are well-known for researchers such as, Scopus and IEEEExplore. Google Scholar and Metapress are also taken into account for a complete collection of relevant study paper. All study papers are analyzed and recorded as search results. All the findings were later on classified according to their type of papers, conference proceedings and journals. The search strings are based on the proposed research questions related to the crowdfunding.

The keywords strings are listed and shown below, while the list of links of different online database that are used for searching process are shown in Table 1.

- i. Crowdfunding platform
- ii. Crowdfunding motivation
- iii. Crowdfunding advantages
- iv. Crowdfunding disadvantages
- v. Crowdfunding deterrent
- vi. Crowdfunding mechanism
- vii. Crowdfunding model
- viii. Crowdfunding effectiveness
- ix. Crowdfunding evaluation
- x. Crowdfunding Performances

Table 1
List of Sources

No	Name	Web Link
1	Scopus	https://www.scopus.com/
2	IEEE Xplore	http://ieeexplore.ieee.org/Xplore/home.jsp
3	Google Scjolar	https://scholar.google.com/
4	ScienceDirect	http://www.sciencedirect.com/

C. Inclusion and Exclusion criteria

These criteria are adopted to further assist in filtering the papers found.

1) Inclusion Criteria

The inclusion criteria are used to help determining which papers found contain relevant data and hence will be used in the study. The inclusion criteria for the research papers are defined based on:

- i. Studies which discuss on crowdfunding platform and model issues.
- ii. Research papers that are written in English.
- iii. Research papers published in the domain of the crowdfunding from the year 2010 to June 2017
- iv. Research papers that present a unique solution or approach to improve current crowdfunding model.

2) Exclusion criteria

The exclusion criteria are based on the following key points:

- i. Website articles
- ii. Research papers which are in other language other than English and Malay
- iii. Research papers from different sources that have same content or studies with the one already recorded (duplicated)

D. Quality Assessment Criteria

The study of the Quality Assessment Criteria benefits in understanding the result and determine the value and the firmness of the conclusion. Quality Assessment Criteria are designed to make sure the quality of the review. It was performed after the data collection was done according the keywords stated. Selective process is done based on the proposed research questions. It is to find out the relevance of study with the questions proposed in the beginning of this systematic review literature. After selective process is done and there are 63 papers were selected for further review. After further review, the number of paper decreased to 32. The list of articles that included in these studies is listed in the references.

IV. RESULTS

This section presents the results of the analysis on the dataset of the studies based on the research questions. Crowdfunding is still new in the research scene, as per shown in Figure 1. Based on the total research papers collected for the review, the number of papers published increase every year. This shows that crowdfunding becomes more popular as it provides new option for collecting funds for businesses or projects. The most papers published was in the 2015 with nine papers, out of 32 over the past five years.

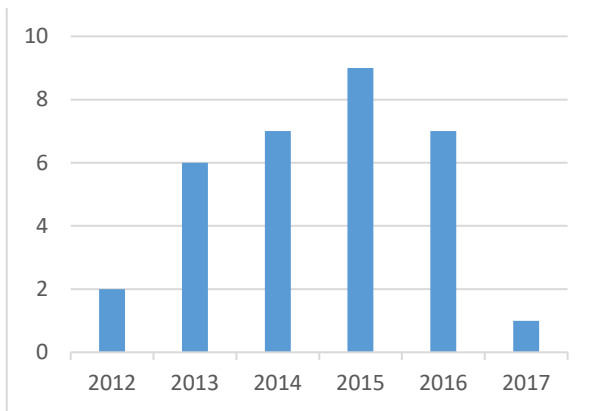


Figure 1: The number of paper published by year

Table 2 shows a list of journals which have research papers included in this literature review. The total number of research papers that published in journals are 10 papers. Most of the research papers are from conference proceedings which is 19 papers as shown in Table 3. Lastly, in Table 4, shows a list of thesis or final year projects that are included in this literature review.

Table 2
List of Journals

Journal	Year	Number of Paper
Mobile Media Sound Moves	2013	1 [10]
Economics And Management	2013	1 [28]
Trends in Ecology & Evolution	2013	1 [12]
SpringerPlus	2013	1 [24]
ACM Transactions on Computer-Human Interaction (TOCHI)	2013	1 [25]
Lancet 2014	2014	1 [13]
Strategic Change	2014	1 [18]
Information Economics and Policy	2015	1 [8]
International Business Management	2016	1 [22]
International Journal of Industrial Engineering and Management (IJIEEM)	2016	1 [2]

Table 3
List of Conferences

Conference	Year	Number of Paper
13th International Conference on Service Systems and Service Management, ICSSSM 2016	2016	2 [6],[11]
ACM Conference on Computer Supported Cooperative Work, CSCW	2014	2 [7],[19]
Designing Interactive Systems: Processes, Practices, Methods, and Techniques, DIS	2014	1 [20]
Human Factors in Computing Systems	2014	2 [15],[26]
9th ACM International Conference on Web Search and Data Mining	2016	1 [27]
24th International Conference on World Wide Web	2015	2 [5],[21]
ACM International Conference on Computer-Supported Cooperative Work and Social Computing	2015	1 [4]
28th Annual ACM Symposium on User Interface Software and Technology	2015	1 [31]
Management of Engineering and Technology	2015	1 [16]
IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAMI)	2016	1 [9]
eChallenges e-2015 Conference	2015	1 [29]
ACM SIGCHI Conference on Human Factors in Computing Systems	2013	1 [32]
International Workshop on Design, Influence, and Social Technologies: Techniques, Impacts and Ethics	2012	1 [1]
Multikonferenz Wirtschaftsinformatik (MKWI)	2016	1 [17]
1 st World Islamic Social Science Congress (WISSC 2015)	2015	1 [3]

Table 4
List of Thesis / Final Year Project

Thesis/Final Year Project/Technical report	University	Year
Analysis of Crowdfunding Descriptions for Technology Projects	Massachusetts Institute of Technology	2013
Crowdfunding for Research: A Case Study In Research Management Centre In Malaysia	Universiti Teknikal Malaysia Melaka	2015
Digging Online: Crowdfunding for Archaeology	University of Waterloo	2017

V. DISCUSSION

In this section, we discuss the answers to our research questions which were prepared earlier in this study.

A. RQ 1. What are the types of current online crowdfunding?

Crowdfunding is a very powerful fundraising techniques that are quite popular nowadays. Crowdfunding comes from the crowdsourcing principle, where requestor wants to seek to motivate contributes to provide resource to achieve the requestor purpose (fund initiatives, share knowledge, perform tasks or change behavior) [6]. As the internet community grows bigger day by day, it becomes very effective and faster than the traditional method (from banks, venture capitalists, and foundations) of fund raising [1]. Mostly crowdfunding model have the participants, which is, founder (project creator), backers (donors) and platform [7]. There are two types of major crowdfunding strategies that are widely used by existing crowdfunding websites, direct donation or all or nothing [8]. But most of the crowdfunding projects use the

reward based donation as they provide tangible rewards that the funder usually worth their donations [7]. Basically, there are four distinct types of crowdfunding [9, 10]:

- i. Equity-based crowdfunding - The investors that support this type of crowdfunding will get their share by investing in the project usually in type of money. This type of crowdfunding usually expected to be in long term. If the project goes big, the investors will get the benefits.
- ii. Lending-based crowdfunding - Like its name, lending-based crowdfunding doesn't like other type of crowdfunding. The investor doesn't invest for some type of rewards, benefit or equity. The concept is the same like lending money from bank, but instead borrowing large money from one bank, the project creator borrows smaller amount of money from large amount of people. It's also called P2P lending. The investor will get their share based on interest rate agree by both sides. This type of crowdfunding considers being a high risk investing as the project creator could disappear with the investor money.
- iii. Reward-based crowdfunding - The investors will invest for a certain type of rewards. For example, for investors that invest in a project for an album to be made, they will get the album after it is finally done. Usually the project creators need money to help them to launch their products. The project creators then will prepare tangible rewards for any investor that invest in their crowdfunding projects. Among all crowdfunding, this consider the most popular platform [11, 12].
- iv. Donation-based crowdfunding - The investor will invest in this type of crowdfunding projects without any expectation from the project creator. As the name suggest, this type of crowdfunding is usually for collecting donation from the public community. Donation-based crowdfunding mostly used as medium to raise money for non-profit cause, like building a school in rural area, feeding the homeless activities or even individual's medical bills.

Along with the success of ArtistShare, more rewards-based online crowdfunding platforms were launched, the most popular option for entrepreneur were Indiegogo in 2008 and Kickstarter in 2009. In addition to the art, many other category of project are listed for example, dance, design, fashion, creative writing and theater [1].

These sites host also funding social cause campaigns like community service, education-based, and environment preservation project and entrepreneurs and small businesses. The crowdfunding industry has quickly emerged as a game changer for entrepreneurs to express their ideas, gain exposure and publicity, and thus gains funding from the community.

It became an incredibly important funding option for new entrepreneurs as other funds need much paperwork and significantly less decreasing in the past few years.

B. RQ 1.1 Are they any specific types of online crowdfunding for research purpose?

For research work to be done, funds are crucial criteria for research to be done successfully. For years, researchers need to get funds from grants provided by the government research budget. It could take time and some ideas might not appeal to the traditional funding agencies [4]. Therefore, fellow scientists and researchers are showing interest to consider

crowdfunding to support their research [13]. For the moment, there are little amount of crowdfunding platforms that built specifically for research purposes and some of them are Experiment.com, Thinkable, Petridish.com, Microryza and #SciFund challenge [13, 14]. There are also other crowdfunding platforms that not specifically built for research purpose but could fit for its requirement like RocketHub, Indiegogo and Kickstarter [13, 15].

Founder of the science crowdfunding website Thinkable, Ben McNeil states that, investment for risky research idea is a need as could be the biggest breakthroughs will come [24]. The features of online crowdfunding for research academic grants can be summarized as follows:

- i. Access to large number of social media - This is one of the features that could help in reaching broad audience online. The feature could help the researchers to attach their project to their social media. They could promote or advertise their research proposal online and reach more people [13].
- ii. Ability for a platform to provide media flexibility for project creators - Most research proposal are in text form. To help in attracting people to read the proposal and maybe fund it, the researchers need to present their proposal with help of another media medium like video and picture. The crowdfunding platform need to have the ability to support video, picture and maybe other media [4].
- iii. Provide features for project creators to give updates to funders - The funders whom are interested surely want to see the updates of the research and this feature allow the researchers to post updates on their research progress [4].

C. RQ 2. What are the motivation factors to the success of online crowdfunding projects?

For a crowdfunding project to be a success, creator or project starter needs to learn the importance of marketing strategies and communication with the public as they need to convince the public to fund their projects [16]. Compare to the existing methods, fund raising could be such a time-consuming work, as the project creator need to fill in all the forms for bank application for loans. Crowdfunding provides much faster and accessible way to get funds through the public assist [4].

For researchers or scientists who use crowdfunding for their research, this give them the opportunities to engage with the public, at the same time could give impact to the communities by promoting teaching, training and learning. Researchers could also share their passion about their work and engage with the public and exchange ideas, stimulate thinking and even spark new ideas from interaction with the wide audience [4].

The project creator could also be motivated to produce a quality project by the funders/backers and established crowd of supporter that maybe support their next project [16]. Other project creator with the same interest could contact each other and collaborate on their project and exchanging tools and equipment [4]. For a small start-up and business, crowdfunding motivates them to continue their business without needing to worry about slow loan process from bank for business capital [17].

D. RQ 2.1 What are the advantages of online crowdfunding for research projects?

There are many young researchers with great and creative ideas but with no connections or resources to submit a successful grant application. Jean Garbarino, director of Science Outreach at Rockefeller University, the director of crowdfunding provides a quicker and accessible way to raise funds for these young researcher [14].

There are many studies have been done on advantages of crowdfunding and some of it could be applied to research domain. By providing outlines of the academia research as simple as possible, employing creativity and passion, it has potential to bridge the academia community and the society in a great way [13]. Researchers that could employ crowdfunding to its fully potential would be likely gain experience rewards beyond monetary gain. Crowdfunding also could motivate the researcher as it expanded their awareness through social media. They could share their work publically and engage in dialogue with public about their work, receive validation and connect with others through social media [1].

To appeal the public to fund a research, researchers need to present their research idea properly for the public to understand their research well and thus generate trust, for example creating video and using of simple but persuasive language. This could help researchers to create a personal connection and network [18]. With bigger network and audience, the community that invested could introduce it to their contact networks, by their investment decision they quasi-recommend the business [19]. Fellow researchers might also could collaborate with other researchers, scientists and professionals with the same interest to further their research idea and sharing tools and resources [15].

E. RQ 3. What are the hindrances that will affect online crowdfunding projects to be successful?

Although crowdfunding is a flexible method for raising funds, there are many deterrents that could interfere with the process and even could make it unsuccessful. As most of the project creators are technical persons, they need to learn to communicate to the community using the language that are appropriate and understandable to the public audience [4, 20]. Another mistake that commonly done by project creators is they are not able to estimate their network size and does not know how to target certain audience that are suitable for their project [21]. The project creator also needs to learn how to market and build their reputation to convince the public funders [22].

Some of the crowdfunding achieve success but the project creator was unable to prepare the rewards that are supposed to be given to the funders as they could not deal with the mass scale rewards [22]. This could lead to distrust and the project creator might gain less fund for his/her next project. Another hindrance that affect the crowdfunding project is lack of self-confidence and afraid to failure by the project creator [23]. Applying for loans from bank or grant for research are considered the normal methods to get funds for projects, but for crowdfunding, the project creator needs to communicate to public and may feel awkward to request funds from their colleagues, family and public as it may break certain social norms [4].

F. RQ 3.1 What are the restraints for the researchers to online crowdfund a research domain?

To be successful in crowdfunding, researchers need to present their research idea in an attractive way and the researchers need to make tradeoffs, with how much technical terms and information they should provide without overloading their potential funders and how brilliant they can make their presentation, without lowering the quality of their research [24]. The way the researchers communicate with their audience are important as the amount raised is proportional with the size of researcher's audience and the effort the researchers make in interacting with their audience through social media and networking [14, 25].

Another restraint that researcher will face is, common crowdfunding projects usually provide some type of rewards to their funder, but for academia research the product are often immaterial [13]. There is also a problem of idea being stolen from documentation offering which reveal too much information [2]. With researchers make full commitment to crowdfunding their research, the probability of failing is always there. Failing in crowdfunding could resulting publically-exposed failure [26].

G. RQ 4. How to evaluate the effectiveness of online crowdfunding?

There are hundreds of thousands crowdfunding projects created but according to several research, more than fifty percent of project created have failed [27, 28]. Crowdfunding is considered to be effective in enabling new idea and innovation to be reality but to calculate the effectiveness of crowdfunding platforms, there are many criteria needed to be taken into measure [17]. Crowdfunding is considered as a new topic and there are many criteria need to be researched and there are not many specific researches on evaluating the effectiveness of crowdfunding platform [7]. Some of the researches are more on the specific function or part of crowdfunding platforms like what features increase the rate of success for project in crowdfunding platform, and with it, increase the effectiveness of the platform.

Some of the measurement are based on the evaluation of the crowdfunding mechanism itself. For example, the valuation of crowdfunding using the SWOT analysis and taxonomy of crowdsourcing campaign [6, 29]. In 2015, a research was performed to compare between the selected crowdfunding platform, kickstarter.com, Crowdfunder.co.uk and Crowdo.com, and the indicator that used to evaluate the effectiveness of the platform is the funding ratio (average sum of pledges per fundraising goal) [30].

H. RQ 5 What is the crowdfunding scene in Southeast Asia especially Malaysia?

Unlike in the US and Europe, crowdfunding starts late in Southeast Asia, but booming due to increasing number of innovative projects continually being crowdfunded in Asia with China leading the charge. In the US and Europe, large crowdfunding platforms with huge assets have their own management (AUM), while in Asia, the crowdfunding operations operated on a small scale and only managed to facilitate small transactions [3].

In Malaysia, crowdfunding is still considered as new and some of the public still skeptical and does not have open mindset to accept this new funding tool because of the risks and uncertainties [31]. But the government still introduced the crowdfunding as it has potential to help small business

and strengthen the local economy. In 2015, The Securities Commission Malaysia (SC) has announced approvals for six equity crowdfunding platforms (ECF) to operate, paving the way for a new alternative fundraising channel for businesses. The six platform operators are, Alix Global, Ata Plus, Crowdonomic, Eureka, PitchIN, and Propellar Crowd+.

VI. CONCLUSION AND FUTURE WORK

Crowdfunding is relatively a new big topic with a lot of potential for research to be done. Among of the online crowdfunding type, reward-based is the most popular type and chosen by many crowdfunding platforms such as kickstarter.com. For many new entrepreneurs from the developing countries, crowdfunding is considered as a better option than the traditional method, as they can use their limited resources to boost their commercial success. It is also good for the developing countries to promote crowdfunding as one of the options for collecting funds as it circulates their money locally.

Crowdfunding could help raise funds more quickly and giving the researchers more time for their research compare to the traditional grantsmanship. Through crowdfunding campaign, researchers need to learn how to publicize their research and present it with proper presentation for the public crowd could understand. While researchers need to learn new skill, they could also exchange idea with the public or find academic peers that shared same interest with them.

The crowdfunding platform for research purpose have features that could help greatly in promoting and reach more crowd online. Some of the features are, (i) access to large number of social media, (ii) media flexibility for the researcher to present their research, and (iii) features for project creators to give updates to funders.

For future research, researchers could study the criteria needed for a crowdfunding platform that would be suitable for academic grantmanship purposes. Due to the reason that academic grantmanship is different from the regular crowdfunding projects and the outcome from an academic research usually is not a product but more on academic progress. A good crowdfunding platform would benefit the academic field due to its ability to promote and reach maximum audience for the project creator.

As crowdfunding scene is evolving through the years, so does its classification and its various type. With further research, taxonomy of online crowdfunding suitable for academic research purpose will be proposed.

ACKNOWLEDGEMENT

This paper is funded by Ministry of Education, Universiti Teknologi Malaysia (Flagship), vote no. Q.J130000.2413.03G42

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