Characteristics and Impact of Research Crowdfunding Projects: An Empirical Analysis Based on the Experiment Platform (Postprint)

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Abstract

[Purpose/Significance] This study outlines the current development status of the scientific research crowdfunding model, takes the Experiment platform as the research object, designs quantitative evaluation indicators, and analyzes the basic characteristics, output impact, and content features of scientific research crowdfunding projects. Investigating the characteristics of scientific research crowdfunding platforms holds significant importance for exploring and developing the scientific research crowdfunding model and understanding novel research activity patterns in the open science environment, while also providing relevant recommendations for project applicants and funders. [Methods/Process] First, based on the scientific research crowdfunding platform—the Experiment crowdfunding project website, we designed a data acquisition process and evaluation indicators. Second, for scientific research crowdfunding projects, we analyzed characteristics such as overall scale and success rate, personnel scale, research duration, participating countries, participating institutions, and funding amounts. Furthermore, focusing on the output outcomes of scientific research crowdfunding projects—experimental records—we analyzed the number of records, views, likes, and comments in conjunction with disciplinary characteristics to reveal their output scale and impact. Finally, we conducted content analysis of successful and failed crowdfunding projects to identify factors influencing crowdfunding success. [Results/Conclusions] Scientific research crowdfunding projects on the Experiment platform exhibit characteristics of small scale, short duration, and high engagement. Compared with other disciplines, the output scale and academic impact of scientific research crowdfunding outcomes are particularly prominent in the fields of biology and ecology. The application success rate of scientific research crowdfunding projects is not directly related to the project research topic, but shows strong correlation with the project's funding budget plan, research capacity, and the thoroughness and feasibility of the research proposal.

Full Text

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Research on the Features and Impact of Research Crowdfunding Projects: An Empirical Analysis Based on the Experiment Platform

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Abstract

[**Objective/Significance**] This paper summarizes the development status of the research crowdfunding model, using the Experiment platform as a case study to design evaluation indicators that analyze the basic characteristics, output impact, and content features of research crowdfunding projects. Investigating the features of research crowdfunding platforms is significant for exploring and developing this model, understanding new patterns of scientific activity in open science environments, and providing recommendations for both project applicants and funders.

[**Method/Process**] First, we designed a data acquisition process and evaluation indicators based on the Experiment crowdfunding platform. Second, we analyzed various features of research crowdfunding projects, including overall scale and success rate, team size, research cycle, participating countries, participating institutions, and funding levels. We further examined project outputs—specifically lab notes—by analyzing record counts, views, likes, and comments across different disciplines to reveal output scale and impact. Finally, we conducted content analysis comparing successful and failed projects to identify factors influencing crowdfunding success.

[**Results/Conclusion**] Experiment platform projects are characterized by small scale, short cycles, and strong participation. Compared to other disciplines, biology and ecology demonstrate particularly prominent output scale and academic impact. Project success rates are not directly related to research topics but show strong correlation with budget planning, research capacity, and the thoroughness and feasibility of proposals.

Keywords: research crowdfunding projects; lab notes; features; impact; altmetrics
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1. Introduction

Today's open science environment provides expanded opportunities for sharing research outcomes and broadens the scope of scientific activities, promoting public participation in science and fostering new citizen science models. The achievements of various mass collaboration projects demonstrate that this new scientific activity paradigm is rapidly developing. Citizen science encompasses two main forms: research crowdsourcing and research crowdfunding. Research crowdsourcing (e.g., Zooniverse, Polymath) harnesses collective intelligence through distributed online collaboration to conduct research and technological innovation. Research crowdfunding refers to researchers publishing project proposals online to raise funds directly from the public and subsequently sharing research results, with representative platforms including #SciFundChallenge, Experiment, and PetriDish.

Research crowdfunding, as a new exploration of open research models, can broadly mobilize social resources for scientific innovation and has demonstrated increasing importance. Studying this model helps us understand open science operating mechanisms and recognize evolving scientific paradigms in the new era. Moreover, as global science moves toward greater openness, monitoring openness across scientific system components and developing appropriate performance evaluation methods to encourage researchers to engage in open science activities have become important issues in science and technology evaluation and scientometrics. Open science emphasizes multi-type data accumulation, and Altmetrics—an analytical method based on data from new scientific communication activities—can evaluate these new scientific development models. Therefore, this study adopts an Altmetrics perspective to evaluate research crowdfunding projects and outputs, analyzing open access data to promote the development of open science evaluation systems and expand scientometric methods in open data applications.

Foreign research crowdfunding platforms have reached considerable scale. While #SciFundChallenge, Experiment, and PetriDish emerged around the same time, the former two ceased operations around 2015 due to financing issues, with relatively small project portfolios. Experiment, supported by the Gates Foundation, has grown into the world's largest research crowdfunding platform with an international user base, playing a significant role in current research crowdfunding activities.

In contrast, China has yet to develop formal research crowdfunding cases or platforms. In 2013, a Zhejiang University professor attempted a humanities translation project via Weibo, but this isolated case differed from the professional platform-based model discussed here.

Existing research on research crowdfunding primarily focuses on model characteristics and developmental significance. Scholars have identified features including numerous participants, small unit amounts, direct financing, interactivity, and openness. Current studies mainly concentrate on conceptual definitions and

feature analysis, with limited empirical research on success factors and minimal analysis of output impact, often based on small samples. This study employs quantitative methods to analyze research crowdfunding project characteristics, focusing on output scale and impact to reveal disciplinary differences and explore open science features and Altmetrics applicability.

2. Empirical Design

Experiment, launched in 2012, is currently the largest and most mature research crowdfunding platform, having received both venture capital and support from Bill Gates. We selected this platform for comprehensive quantitative analysis of its research crowdfunding projects and outputs—lab notes.

2.1 Data Acquisition

We constructed a web crawler in R to retrieve data from Experiment, including project basic information (applicants, funding amounts, disciplines), lab notes, and user engagement data (views, likes, comments). Due to platform characteristics, all projects retain valid URLs, but failed projects are removed from listings. We therefore scanned applicant homepages to obtain URLs for expired and failed projects.

Data were collected on November 30, 2017, covering 2012-2017. After cleaning, we obtained information on 1,670 projects: 744 successful, 902 failed, 7 pending, and 17 ongoing. Our analysis focuses on the 1,646 successful and failed projects.

2.2 Indicator Design

2.2.1 Project Feature Indicators We designed indicators to describe overall platform characteristics, including total scale and success rate, team size, research cycle, participating countries, institutions, and funding levels. Table 1 lists these metrics, with complex calculations detailed in the results section.

2.2.2 Output Scale and Impact Indicators Within our timeframe, only 11.7% of successful projects produced traditional publications like academic papers, while 90.6% shared results through lab notes containing research photos, data analyses, and software designs. These notes include view, like, and comment data—similar to Altmetrics indicators for social impact. Following Haustein et al.'s research on Altmetrics user behaviors, views represent access behavior while likes and comments represent evaluation behavior, collectively reflecting impact beyond academic circles.

We developed Altmetrics-based indicators for lab note outputs (Table 2), measuring output scale through note counts and impact through views, likes, and comments, with normalized metrics to account for disciplinary differences.

3. Results

3.1 Project Feature Analysis

3.1.1 Overall Scale and Success Rate Table 3 shows annual project numbers and success rates from 2012-2017. Project numbers increased overall, peaking in 2016. Annual success rates ranged from 34.2% to 64.5%, with a six-year average of 45.2%, indicating more failures than successes.

3.1.2 Team Size and Success Rate Table 4 presents project distribution by applicant team size. Single-applicant projects dominate both in total numbers and successful cases, indicating solo research as the primary model. While 2-5 person teams are also common, project numbers decrease as team size increases, showing research crowdfunding favors small-scale collaboration.

3.1.3 Research Cycle of Successful Projects Research cycle length represents a key feature. Based on 744 successful projects, we determined cycles from research plans and lab note publication dates. Table 5 shows most projects concentrate in the 0-2 year range, with sub-one-year projects being most common. This demonstrates the short-cycle, high-timeliness characteristic of research crowdfunding.

3.1.4 Country Distribution Figure 1 [Figure 1: see original paper] displays participating countries. A total of 61 countries have published projects, with nearly 80% from the United States, followed by the UK, Canada, Australia, and Germany. This shows US dominance and limited participation from developing countries like South Africa and Brazil. China has published only two projects on the platform.

3.1.5 Institutional Analysis We analyzed institutional types to identify main participants. Independent researchers—defined as those marked "individual/independent researchers" without institutional affiliation—include cross-disciplinary researchers, retired scientists, and amateur enthusiasts. Statistical analysis identified 724 institutions, primarily universities, research institutes, non-profit organizations, and independent researchers. Universities publish the most projects, followed by research institutions and non-profits (Figure 2 [Figure 2: see original paper]). Top institutions include the University of Washington, University of South Carolina, and Yale University (Figure 3 [Figure 3: see original paper]), showing active participation from traditional research institutions while also providing opportunities for unaffiliated researchers.

3.1.6 Funding Levels Figure 4 [Figure 4: see original paper] shows target funding distribution. Most projects aim for $1,000-$6,000, confirming the small-scale nature consistent with the predominance of solo applicants.

3.1.7 Per-Funder Contribution Figure 5 [Figure 5: see original paper] presents per-funder contribution distributions. Most contributions fall under $100, with similar numbers in the under-$50 and $50-$100 ranges, indicating modest but existing public support. Figure 6 [Figure 6: see original paper] shows the average number of funders per successful project increased from 2012-2017 (with a slight 2017 decline), demonstrating growing public engagement.

3.2 Output Scale and Impact Analysis

Lab notes are the primary output form on Experiment. The 1,646 projects published 6,823 lab notes total: 5,327 from successful projects and 1,496 from failed projects. Due to incomplete data from failed projects, we analyzed successful projects only.

3.2.1 Output Scale **(1) Overall Output Scale.** Figure 7 [Figure 7: see original paper] shows lab note publication increased annually from 2012-2017, indicating lab notes' growing importance as an output format.

(2) Disciplinary Output Scale Comparison. Table 6 and Figure 8 [Figure 8: see original paper] present project numbers and lab note counts across 20 disciplines. Biology and ecology produce the most lab notes, with combined output exceeding that of the other 18 disciplines. These life sciences fields, often related to public health issues, show the largest output scale.

To account for disciplinary size differences, we analyzed input-output efficiency from funding and personnel perspectives (Table 7 , Figure 9 [Figure 9: see original paper]). By funding input, art design, physics, chemistry, and materials science show high efficiency despite small output scale, while psychology maintains both high output and efficiency. Biology, ecology, and pharmacology have large output but medium-low efficiency. By personnel input, physics and chemistry maintain high efficiency, with paleontology, neuroscience, and ecology also performing well.

3.2.2 Impact Views indicate general attention, while likes and comments reveal deeper engagement.

(1) Overall Impact. Table 8 shows lab notes, views, likes, and comments all increased annually from 2012-2017, reflecting both the format's growing prominence and increasing public acceptance.

Table 9 examines impact by funding level. While most projects cluster in the $1,000-$6,000 range, higher funding generally correlates with greater impact.

Table 10 analyzes impact by research cycle length using projects started in 2013-2015 to control for platform maturity. No clear correlation exists between cycle length and impact, suggesting that while crowdfunding projects are short-cycle, duration doesn't significantly affect impact.

(2) Disciplinary Impact Comparison. Table 11 compares views, likes, and comments across 20 disciplines. Biology and ecology have the highest absolute numbers, correlating with their large output scale. Normalized metrics (average per lab note) show materials science, pharmacology, chemistry, biology, and ecology rank highest—disciplines closely related to daily life and health. Basic and specialized fields like politics and physics rank lower. Data science shows the highest annual growth rate in average views, reflecting its rising prominence. Some large disciplines like biology and ecology show negative growth rates.

3.3 Content Feature Analysis

Existing research shows crowdfunding favors small-scale, short-cycle projects. To further explore success factors, we compared successful and failed projects' content.

First, we examined the relationship between success rate and research topics. Each Experiment project includes an abstract summarizing research purpose and plans. Comparing keyword clouds of successful (Figure 10 [Figure 10: see original paper]) and failed (Figure 11 [Figure 11: see original paper]) projects reveals no significant topical differences—both focus on life sciences, environmental science, species, health, population, disease, and data. Successful projects only show significantly higher attention to "Conservation" and "habitat" themes, suggesting topic choice doesn't directly determine success.

Through case analysis, we found successful projects differ in "persuasiveness":

(1) Budget Planning: Successful projects provide more detailed budgets (Figure 12 [Figure 12: see original paper]), typically with 4-8 specific modules and clear funding plans for different support levels. Failed projects have simpler budgets (2-4 modules) focusing mainly on fieldwork, equipment, and personnel costs.

(2) Research Foundation: Successful projects demonstrate strong research capacity through prior publications, reports, or team members' academic profiles (e.g., ResearchGate). During crowdfunding, teams regularly upload lab notes to prove research value and attract funders.

4. Conclusion and Discussion

Research crowdfunding is a new scientific activity model emerging in open science environments, still in its early exploratory stages. Studying this model provides references for open science implementation and helps understand new research paradigms. Open science emphasizes the value and impact of new research outputs, and Altmetrics offers effective methods for evaluating these new data types. This study uses Altmetrics to analyze open data, promoting open science evaluation system development.

Through quantitative analysis of Experiment platform projects, we summarize current crowdfunding characteristics, analyze output and impact levels, and

examine content features to provide constructive suggestions for stakeholders.

Key Findings:

(1) **Small-scale, short-cycle, strong participation:** Experiment projects feature solo and small-team research, target funding of $1,000-$6,000, and cycles under one year. "Strong participation" includes not only universities and research institutions but also independent researchers.

(2) **Biology and ecology prominence:** Natural science projects, particularly biology and ecology, show greater quantity, personnel, funding efficiency, and impact than humanities and social sciences. This relates to these fields' connections to human health and public concern.

(3) **Success factors:** Success rate isn't directly related to research topics—successful and failed projects share similar topical focuses. However, success correlates strongly with detailed budget planning, research capacity, and feasibility. Like traditional grant applications, strong research foundations and thorough proposals win support.

Implications:

Research crowdfunding provides a new funding model that lowers barriers to scientific inquiry. Independent researchers can use it for immediate, small-scale questions. For government agencies, it offers alternative support mechanisms and promotes open data and access. Encouraging researchers and students to apply can reduce national funding pressure while fostering open science ecosystem development.

From an output perspective, biology and ecology's prominence reflects public engagement with life sciences. Crowdfunding connects the public with research and promotes field development.

While foreign platforms have developed, China remains in a wait-and-see phase. Lessons include: (1) crowdfunding's flexibility compared to rigid institutional funding; (2) its ability to fund experimental projects with uncertain risks that traditional funders avoid; (3) its support for early-career researchers exploring cutting-edge questions.

This study demonstrates Altmetrics' applicability for evaluating new scientific activities in open science, with potential for broader application as open science develops.

Limitations:

(1) Data precision: User coverage and data volume affect evaluation accuracy. Platforms focus on crowdfunding rather than output evaluation, lacking APIs or third-party data management, limiting crawler precision.

(2) Output scope: We analyzed only lab notes due to small sample sizes and difficulty tracking other outputs like papers and patents.

(3) Theoretical depth: As an emerging activity with evolving models, detailed theoretical support for all statistical findings is limited, though macro-level analysis provides heuristic value.

(4) Platform comparison: No comparable platforms currently operating at Experiment's scale exist for cross-platform analysis.

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Author Contributions

Ding Jielan: Conducted literature review, revised research framework and paper.
Chen Liyue: Proposed research framework, conducted literature review, data processing and empirical experiments, wrote the paper.
Liu Xiwen: Proposed research questions, adjusted paper framework, discussed conclusions, revised paper.

Exploring the Features and Impact of Research Crowdfunding Projects: A Case Study of Experiment

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Abstract: [Purpose/significance] This paper briefly summarizes the development status of the research crowdfunding model, uses the Experiment platform as the research object, designs evaluation indicators, and analyzes the basic features of research crowdfunding projects, the impact of project outputs, and content characteristics. This study can develop the research crowdfunding model, help understand new research activities in an open science environment, and provide relevant suggestions for project applicants and funders. [Method/process] Firstly, the paper gets data from the research crowdfunding website "Experiment" and designs a series of indicators to evaluate them. Secondly, this paper analyzes the overall scale, success rate, staff scale, research cycle, countries, organizations, funding levels and other features of research crowdfunding projects. In addition, the paper focuses on the lab notes, which are the outputs of research

crowdfunding projects, analyzing the numbers of lab note, view, like and comment based on the disciplinary characteristics so that it can reveal the scale and impact of these outputs. [Result/conclusion] Finally, the result shows that the research crowdfunding projects of "Experiment" are characterized by small-scale, short accomplishing time and strong participation, meanwhile, the scale and impact of projects' outputs in biology and ecology are more prominent than other disciplines.

Keywords: research crowdfunding projects; lab note; feature; impact; altmetrics

Note: Figure translations are in progress. See original paper for figures.