วารสารความเป็นธรรมทางสังคมและความเหลื่อมล้ำ

การฉ้อฉลในการเผยแพร่งานทางวิชาการ: กลโกงภายใต้วัฒนธรรม
"เผยแพร่หรือแพ้พ่าย"
Manipulation of academic publication: gaming the system
in publish-or-perish culture

จิตติพร ฉายแสงมงคล[ก1]
Jittiporn Chaisaingmongkol[a]

[ก]มูลนิธิเครือข่ายเพื่อสังคมเป็นธรรม
[a]Foundation for Just Society Network

บทคัดย่อ

        แรงกดดันของนักวิจัยในการเผยแพร่ผลงานทางวิชาการเพิ่มสูงขึ้นในช่วงหลายปีที่ผ่านมา มหาวิทยาลัย
และสถาบันวิจัยใช้มาตรการต่าง ๆ ในการจูงใจหรือกดดันให้นักวิจัยตีพิมพ์ผลงาน ทั้งการให้เงินสนับสนุนหรือ
ค่าตอบแทนการตีพิมพ์ หรือการไม่ขยายสัญญาการทำงานหากมีจำนวนการตีพิมพ์ที่ไม่เป็นไปตามข้อกำหนด
นอกจากนี้การให้ทุนวิจัยและตำแหน่งทางวิชาการได้เน้นไปที่ตัวชี้วัดเชิงปริมาณเช่นจำนวนบทความจำนวนการ
อ้างอิง ค่าดัชนีผลกระทบการอ้างอิงหรือการจัดอันดับวารสาร ปัจจัยเหล่านี้อาจนำไปสู่การประพฤติที่ไม่เหมาะสม
ในการเผยแพร่งานวิจัย บทความชิ้นนี้ต้องการให้ภาพรวมของการประพฤติผิดจรรยาบรรณการเผยแพร่งานวิจัย
รวมถึงการฉ้อฉลในการตีพิมพ์อย่างเป็นระบบ โดยจะกล่าวถึงรูปแบบเฉพาะต่าง ๆ ของพฤติกรรมเหล่านี้เพื่อให้
ผู้อ่านและผู้เขียนงานทางวิชาการสามารถแยกแยะได้บทความนี้ยังมีจุดมุ่งหมายเพื่อสร้างความตระหนักให้กับ
มหาวิทยาลัยหน่วยงานให้ทุนและผู้กำหนดนโยบายวิจัยต่าง ๆ เพื่อให้ทบทวนเรื่องการใช้ตัวชี้วัดเชิงปริมาณในการ
ประเมินผลงานทางวิชาการ เพื่อช่วยลดความเสียหายที่จะเกิดจากวัฒนธรรม "เผยแพร่หรือแพ้พ่าย"

คำสำคัญ: การฉ้อฉลทางวิชาการ, จริยธรรมในการตีพิมพ์, การปั่นจำนวนอ้างอิง, การรับจ้างทำผลงานทาง
        วิชาการ, สำนักพิมพ์ที่ล่าเหยื่อ

Abstract

Pressure to publish in academic circles has increased in the recent years. Universities and research institutes use different measures to motivate publications, including monetary publication rewards or refusing to extend work contracts if publication requirementsare not met. Furthermore, research funding and academic positions are awarded with strong emphasis on quantitative publication metrics such as number of papers, citation number and journal ranking. A combination of these factors could lead to serious publication misconduct. This article aims to give an overview of publication fraud and systematic publication manipulation, including their characteristic patterns so that readers and authors of academic paperscan recognize such manipulation themselves. This article also aims to raise awareness among universities, funding agencies and research policy makers to rethink their use of quantitative criterion for academic evaluation and helpmitigate the downsides of publish-or-perish culture.

Keywords: academic fraud, publication ethics, citation manipulation, paper mills, predatory publisher.

Publish-or-perish culture

The pressure for Thai academics to publish frequently has been increasing in the past decades. Combined with an obsession of universities with their yearly ranking, measurement of academic performance has been pushed toward quantitative matrices (Lao, 2018). Often, researchers are required to publish a certain amount of manuscripts per year along with other unrealistic academic work requirements. Bonuses for paid to researcher for publishing in certain journals have been introduced to increase publication motivation. Furthermore, research funding and academic positions are awarded with strong emphasis on quantitative publication metrics such as number of papers, citation number and journal ranking A combination of these factors could lead to serious publication misconduct (Grimes, Bauch, & Ioannidis, 2018).

Worldwide, reports of publication fraud mostly come from STEM fields (Science, technology, engineering, and mathematics). This might be due to the data-centric nature of such research that is conducive to fact checking. Higher accessibility of publication databases of STEM fields makes them eligible for large quantitative analysis using data mining and statistical tools. But this does not exclude publications in other fields of research from publication manipulation. A survey by the Committee on Publication Ethics (COPE) in 2019 found that editors of arts, humanities, and social sciences journals considered plagiarism, poor attribution standards, fraudulent submissions and data and/or image fabrication to be issues of serious concern. Nearly 58% of editors had direct experience with plagiarism, while 20% encountered fraudulent submissions. Many are in the opinion that technological changes, data-driven culture and a metrics-based academic pressure might exacerbate ethical issues in the future (Committee on Publication Ethics, 2019).

Here, we discuss common types of publication fraud concerning publication ethics of individual or small group of authors. Systematic manipulation of publication, however, reflects a flaw of the academic evaluation system at large.

Common types of publication fraud

Research Misconduct

The most common types of publication fraud involve research misconduct. According to the U.S Office of Science and Technology Policy, research misconduct is defined as "fabrication, falsification or plagiarism in proposing, performing or reviewing research or in reporting research results" ("Federal policies | ORI - The Office of Research Integrity," n.d.)

- **Falsification** involves manipulation of data either during the collection of such data or manipulation during the analysis to alter the outcomes and findings.
- **Fabrication** is the practice of construction of nonexistent data sets.
- **Plagiarism** is defined broadly as the appropriation of another person ideas or words without attribution. This also include **self-plagiarism** in which the authors use the same text in multiple documents.

Plagiarism is the most common type of publication fraud. However, with more developed software, plagiarism can be detected more easily and frequently. Falsification and fabrication of data is harder to prove and could require very intensive investigation to uncover. Nevertheless, this category of publication fraud is well known and has been discussed in academia extensively, especially in biomedical research (The Committee on Publication Ethics (COPE), 2000).

A comprehensive meta-analysis of survey data from scientists and researchers in many disciplines by Fanelli reported that almost 2% of scientist admitted data fabrication and falsification at least once. Almost 34% admitted to some other forms of questionable practice. But when asking about observation of colleges behaviors, the number of falsification and fabrication went up to 14% and questionable research practice went up to 72%. If this is a conservative estimation of misconduct, the number reported could just be the tip of the iceberg. Furthermore, misconduct was reported more frequently by medical/pharmacological researchers than others (Fanelli, 2009).

Since researchers in biomedical fields are under scrutiny of research misconduct, there has been push toward transparency and reproducibility of such research for many years. An array of research practiceshave been introduced, such as pre-registered protocols, ethics approval, consent signing, raw data and analysis script depository, and other such detailed documentation of the study. These lead to increased independent verification and reproducibility of the research. However, these practices are not the norm among social science fields. Even though reports of serious research misconduct are less frequent in social science, reproducibility and transparency is a main concern (Miguel et al., 2014). In 2020, Hardwicke et al reported minimal adoption of

transparency practices in social research from a random sample of articles published between 2014 and 2017. Most resources such as material, protocols, raw data and analysis scripts were not available. Disclosure of funding and conflict of interest were modest, replication studies were rare and less than half of the articles were publicly available (Hardwicke et al., 2020). The latter could lead to underestimation of research misconduct in social science studies due to lack of comprehensive publication analysis.

Redundant and salami publications

Redundant and salami publication are subtypes of self-plagiarism. Researchers resource to these methods to increase number of publications under their name.

- **Redundant publication** involves substantial overlapping of paper content (more than two thirds) with an already published work of the same author ("Salami publication | COPE: Committee on Publication Ethics," n.d.).

- **Salami publication** concerns publication of multiple manuscripts from a single study. Such articles report on a segment of the collected data that is enough to form a manuscript, also called **"least publishable unit (LPU) or minimal publishable unit (MPU)".** Like identical slices of salami, these publications are usually characterized by similarity of hypothesis, methodology, sample size and results with the same set of authors. Due to lack of text similarity, salami publications often evade detection by plagiarism software. The greater number of articles resulting from this practice also increases the number of citations they receive, giving the authors undeserved benefit by artificially inflating their citation index and unfair advantage to access funding and academic positions(Šupak Smolčić, 2013)

An extreme example of salami publication is a set of 33 articles published in the journal "Archives of Iranian Medicine" on November 2017about one nation-wide survey study(Noorbala et al., 2017). The articles described the survey resultson the mental health of local populations in each of 31 provinces and 2 papers sum up the whole survey, all articles having more or less the same set of authors ("Scientific Salami Slicing: 33 Papers from 1 Study | Information Society," n.d.). However, publishing multiple papers from very large data sets wherein secondary outcomes and secondary analysis are reportedthat differ from the primary study is not always considered salami publication. Smolčić discussed many examples in more detail (Šupak Smolčić, 2013). Publishers realize the problem of redundant and salami publication and use software such as iThenticate to detect this type of self-plagiarism. Often, any paper that shows more than 30% of text replicated from another paper are then looked at more carefully (Elliott, 2013).

Systematic manipulation of the publication process

Even though many argue that intentional falsification, fabrication or plagiarisms might represent small percentage of academic publication, more and more reports about systematic manipulation of the publication processhave emerged worldwide ranging from systematic citation manipulation, ghostwritten articles, mass produced research papers and the rise of predatory journals (Davis, 2012; Focus, 2013; Kolata, 2017; Schneider, 2020; Van Noorden, 2013).

The Committee on Publication Ethics (COPE) defines systematic manipulation as follows: "Systematic manipulation of the publication process is where an individual or a group of individuals have repeatedly used dishonest or fraudulent practices to:

- prevent or inappropriately influence the independent assessment of a piece of scholarly work by an independent peer;
- inappropriately attribute authorship of a piece of scholarly work;
- publish fabricated or plagiarized research.

Systematic manipulation is conducted with the goal of influencing the publication record and/or achieving financial gain, and involves more than one manuscript and possibly more than one journal." (The Committee on Publication Ethics (COPE, 2018)

Common types of systematic manipulation of the publication process

Paper mills

Byrne and Christopher defined paper mills as a variety of services provided to academics, ranging from providing research data, ghostwrittenarticles, fraudulent or fabricated manuscript and submission service. Though the phrase was coined to describe fraudulent publication practices in China, paper mills operations are nowthought to be an international phenomenon (Byrne & Christopher, 2020). The paper mill business model is likely based on the publish-or-perish culture, which create the "clients" who want to publish to protect their positions. In research fields that require experimental data, these data are likely to be falsified or fabricated. On the other hand, the manuscripts need to look authentic to meet the requirements of the publisher. In order to keep the price of such services affordable, a mass production strategy could be applied.

Mass production of manuscripts might utilize the use of manuscript templates resulting in publications that show unusual similarity sharing common features. Such "clones" start with a generic study question and hypothesis being used in similar topics but slightly differ in their context, e.g. in different countries, industries or study populations. These clone papers might have similar titles that substitute one country for another or change the subject term. The study design and methodology of these publications are highly similar and superficial, e.g. use of surveys without description of questionnaire and the same approach of data analysis. The tables, figures and graphics show the same format in almost identical order, suggesting the use of manuscript templates facilitating high-throughput publication.

Paper mills may need to take great care to reduce textual similarity between manuscripts, so that it could evade algorithmic detection. Highly similar manuscripts could be distributed across different authors teams where the topic would match to authors interest or affiliation. Sometimes template manuscripts are submitted to different journals in the short period of time. Sometimes a set of similar papers are published in the same journal and even in the same issue.

Publication generated from paper mills are serious threat to the advancement in research. The operation details of paper mills are still poorly understood and they can change their mode of operation quickly to avoid detection (i.e. game the system). Journal editors and readers who are very familiar with the publication style in their own field should screen manuscripts for suspicious features describe above. Editors and readers could require raw data under the reported results. Note that the practice of transparency and reproducibility-related research as described in Hardwicke et al., 2020 could partly prevent paper mill operation.

Citation manipulation

In recent years, citation metrics have been used toquantify impact of academic output, alongside the number of publicationsthemselves. However, citation manipulation has been discovered and reported around the world and will be discussed in detailed in the sections below. The level of manipulation ranges from a group of authors, sometimes internationally, citing each other's publications, peer-reviewers asking the authors to cite themselves without any justification, or editors asking authors to cite unrelated publications from their own journal or cite publications of their own association. In some cases, a group of journals agree to cite each other to increase their respective impact factors while avoiding detection of journal self-citation. However, the present anomalous citation pattern does not always indicate deliberate citation manipulation. Further factors such as niche publications need to be carefully considered.

Self-citation

Occasionally, authors and groups of authors will cite their own previous works. The same goes for journals citing their own published papers. But excessive self-citation could distort citation metrics. Over 6 decades (from 1950-2013), both mean number of author self-citations per paper and the maximal number of self-citationshas increase substantially, especially after introduction of h-index (Fire & Guestrin, 2019). A journal might also practice self-citation to boost its impact factors. This type of self-citation will be discussed below.

Coercive citation

Journal editors have incentive to coerce authors to add citation to the journal, since the impact factor metric includes journal-self citation. An editor could direct authors to add citations from journal's recent article without any scientific justification. Such practice is called "coercive citation". Characteristic to coercive citation is citation direction that doesn't improve quality of the paper, giving no indication what the paper is lacking, and perhaps doesn't point to a specific article for author to review and instead suggest author to cite any article from the editor's journal

(Wilhite & Fong, 2012). An example from a Thai society journal states: "In addition, the association would like to ask for your cooperation in citing at least a few more articles that were previously published in the association's journals" (personal communication). Such statement could create an impression of "adding citation or risk rejection" to the author.

A survey from 2012 of 6672 researchers from economic, sociology, psychology and multiple business disciplines found that 175 journals were identified as coercers by asking the authors to cite journal's article. The study also observed power structure within the academic circle; young faculty members will not resist the coercion, whereas senior faculty members will resist more frequently. Editors are more likely to target assistant and associate professors with fewer authors on the manuscript. Journals from for-profit publisher and academic societies had greater use of coercive tactics than journals from university press. Worryingly, the study found familiarity effect of coercive practice. The more coercion is practiced in the academic field, the less inappropriate researchers in that field viewed such practice (Wilhite & Fong, 2012).

Journal self-citationand citation stacking

Apart from the coercive citation practice mentioned above, journalscan inflate their impact factor by publishing a large number of non-research articles such as editorial, letters and others items that could gather citations, adding the count in the numerator without increasing the journal impact factor denominator. A journal may publish a lot of reviews, which will get more citation than research article or publish papers that will be widely cited despite questionable scientific value. For example, a journal run by the professional society could publish professional society guidelines or disease definitions that became a standard reference increasing citation counts(Ioannidis & Thombs, 2019).

Another practice known as "citation stacking" involvesa large number of citations being exchanged between two or more journals. One journal might "donate" its citation to other journals without practicing self-citation. If several journals agree to cite each other's papers, thus inflating citations of the whole group, this could be called "citation cartel". The editors of these journals would work together to avoid excessive self-citation, hence escaping detection. Often the citation boost happensaround the time of impact factor calculation. Despite this tactic, the yearly published "Journal Citation Reports" (JCR) regularly discovered "anomalous citation patterns"of both excessive journal self-citation and citation stacking. The JCR publisher would then suppress the citation statistics journals displaying such patterns (Van Noorden, 2013). But recently, the networks of citation cartel have been widening their efforts from editors to authors of the paper. An editor might coerce authors to cite journal within the cartel instead of their own journal, hence more difficult to detect.

Predatory publishing and conferences

Predatory publishing is defined as a for-profit publication scheme which bypasses the peer review process and publishes anything when article processing charges were paid. The publisher frequently deceives the authors by promising rigorous review and other editorial services, although many authors are aware of this practice. Some predatory publishers might pose as non-profit organization such as academic society or research institution. There are several criteria to spot predatory publishing (Committee on Publication Ethics (COPE), 2019; Misra et al., 2017; Shamseer et al., 2017; Umlauf & Mochizuki, 2018). But with the advance of the internet in recent decades, problems with predatory publishing have increased sharply, along with other types academic fraud such as fake conferences, identity fraud and hijacking professional journal websites. This for-profit practice thrives in publish-or-perish culture, exploiting academics desperation to publish for carrier advancement and wasting government budget.

A longitudinal study of open access journals between 2010-2014 identified over 11,000 predatory journals according to Beall's list with publication volumes that increased from 53,000 to 420,000 articles. Since 2012, smaller predatory publishers with less than 100 journals take the largest market share with article processing charges around 100 USD. Most publishers and authors came from India and other countries in Asia. The low article processing charges reflects the target group of those journals being researchers from developing countries. Articles were published in predatory open access journal within 2-3 months of submission, compared to average publishing timeline for reputable open access journal that ranged between 3–5 months (Shen & Björk, 2015).

Some predatory publishers also organize predatory conferences and publish predatory proceedings of those conferences. These conferences lack of any academic exchange between participants. Famous speakers might not appear as advertised. Respected academics listed as conference advisors might know about the event or the organization at all. Sometimes well-known conferences are hijacked by slight name changes, similar to slight name change of predatory journals to imitate reputable journal. These fake conference are particularly expensive, since scholars will waste their travel budget attending them (Cobey et al., 2017; Umlauf & Mochizuki, 2018). COPE listed an online guide "Think.Check.Attend." to assist scholars to judge the legitimacy and academic credentials of conferences (https://thinkcheckattend.org/).

Goodhart's law in action

A large-scale analysis of academic publication of more than 120 million papersandcovering over 20,000 journals elucidates optimizing strategies of academic publishing over the last century(Fire & Guestrin, 2019). Common quantitative metrics such as number of publication, journal impact factors or even citation numbers has been compromised by different measures to game the system. Papers tend to get shorter, inflating number of publications. Salami-slicing strategy and redundant publication were designed to inflate the publication number in the first place. Combined with longer author lists, the number of publications may cease to be useful metric for academic productivity.

Citation based metrics such as h-index has been affected by extremely high numbers of published papers, self-citation and artificially long reference lists as well as citation coercion practiced by editors. Such malpractice in citation manipulation finally leads to manipulation of journal ranking and impact factor. Furthermore, there is bias of top journals habitually publishing papers from the same author groups, so called "old boys' club". Fire and Guestrin argued that their results demonstrate Goodhart's law which states that: "When a measure becomes the target, the measure itself ceases to be meaningful, useful or accurate."

Furthermore, applying the same quantitative metric across different fields of research is also deeply unfair for researchers in low-citation field, since each field has different characteristics of its publication. This might lead to inequitable resource allocation, especially when combined with the obsession about university world ranking. Institutes might be incentivized to stop funding less-cited research fields and invest more in high-cited research. (Fire & Guestrin, 2019).

Overcoming the system

Academics might fall victim of publication malpractice due to lack of knowledge or lack awareness about publication ethics. Many prevention measures are focused on individual solutions such as awareness building education, seminars or guidelines for researchers. On an intuitional level, more comprehensive indicesthat are somewhat more "gaming proof" could be introduced. For examples, the PQRST index takes other dimensions of research such as indices of study design quality, reproducibility, data sharing, and translational impactinto account(Ioannidis & Khoury, 2014). To reduce coercive citation practice, journal self-citation should be removed from the journal impact factor calculation, and journals could ban their editor from coercing reinforcing publication ethics. Funding agencies and academic organization in many countries evaluate their researchers based on publication in 'international' journals without monitoring journal credential. It's critical that these institutions give more consideration to which journals should be deemed legitimate. In 2019 India's higher education regulatory and funding agency has removed over 4,000 predatory journals from its "white-list" of approved journals for publishing (Patwardhan, 2019). Reducing incentive and raising the cost of unethical publication practice could mitigate the problem. In March 2020, China's science and education ministries released an order banning cash rewards for publishing in Science Citation Index (SCI) journals and discouraging the promotion or recruitment of researchers based solely on number of publications or citations (Mallapaty, 2020).

Unfortunately, many authors are aware of publication manipulation and decide to take the risk, since the chance for career advancement seems worth the potential penalties. The main solution should be focused on policy level. Several analyses on retractions, corrections and bias in publications consistently suggest that the national policy that can be legally enforced could reduce research misconduct. Policies that promote good research and publication practices, foster open criticism and transparent communication among academics could ensure research integrity in the future (Fanelli, Costas, Fang, Casadevall, & Bik, 2019; Fanelli, Costas, & Larivière,

2015). Apart from raising awareness among individual academics to avoid predatory publisher, funding agencies and government organizations should penalize such malpractice. In 2016 the US federal trade commission (FTC) filed charges against OMICS Group Inc. of deceptive marketing claims about their journals and conferences. The FTC won the court case against the company in 2019 and the court imposed a fine of approximately US $50.1 million on OMICS (Committee on Publication Ethics (COPE), 2019).

We need to consider a comprehensive evaluation system for research quality. Academics should be judged for appointment and promotion based on quality of their published research and its relevance to local need, rather than quantity. The effect of policy change on publication can be observed in the Research Assessment Exercise (REA), a 5-yearly cycle academic assessment in the United Kingdom. When total publications counts were requested in 1992, total number of publications of UK scientists increased. When REA shifted their evaluation criteria in 1996 by not asking for quantity information and only requesting the submission of approximately four publications from individual researchers over a 5-year period, UK authors increased their publication in journals with a relatively high citation impact

Finally, publication misconduct and manipulation will never be eliminated as long as universities and funding agencies use quantitative criterion for academic advancement. On a policy level, this will require rejecting unrealistic publication requirements, forgoing obsession with publication number and university ranking and integrating more qualitative measures of academic productivity. In the era of mega-journals and preprint repositories, we need to rethink our academic evaluation system and moderate the publish-or-perish culture.

Acknowledgement

Funding

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