



Received: August 27, 2024

Revised: September 29, 2024

Accepted: October 30, 2024

*Corresponding author: Michael Mncedisi Willie, Council for Medical Schemes, Pretoria, South Africa.

E-mail: m.willie@medicalschemes.co.za

DESCRIPTIVE OF QUANTITATIVE DATA | RESEARCH ARTICLE

Citation Cartels: Understanding Their Emergence and Impact on the Academic World

Michael Mncedisi Willie*

*Council for Medical Schemes, Pretoria, South Africa. Email: m.willie@medicalschemes.co.za

Abstract: Citation metrics have become pivotal in evaluating academic research and influencing funding, promotions, and institutional prestige. However, the increasing emphasis on these metrics has given rise to unethical practices, notably citation cartels, which artificially inflate citation counts through collusive agreements among researchers or journals. This study investigates the prevalence and impact of citation cartels by analysing citation patterns in recent papers. Using a systematic approach, we examined citation data across five papers to identify patterns of collusion and the extent of citation inflation. The results reveal that Author 1 was cited in every reference across four out of five papers, either as a sole author or co-author, with a direct or indirect responsibility for 100% of the citations. Similarly, Authors 2 and 3 demonstrated substantial influence, with median citation shares of 36% and 35%, respectively. These findings highlight the significant role of key authors in shaping citation distributions and raise concerns about the integrity of citation metrics. The study concludes with recommendations for addressing citation cartels, including implementing detection systems, enhanced peer review processes, and a more balanced approach to evaluating research impact.

Keywords: Citation Cartels, Citation Metrics, Research Evaluation, Scholarly Influence, Unethical Practices, Publication Patterns, Research Integrity.

1. INTRODUCTION

Citation metrics have evolved into a central component of academic evaluation, critical indicators of research impact and scholarly influence. These metrics are crucial in determining funding allocations, academic promotions, and the overall reputation of researchers and institutions (Garfield, 2006). As a result, there has been an increasing emphasis on the quantity and visibility of citations, which has become a significant driver of academic behaviour. While citation metrics can provide valuable insights into the dissemination and influence of research, the intense focus on these metrics has also given rise to unintended and unethical practices (Fister, Fister & Perc, 2016; Perez, Bar-Ilan, Cohen & Schreiber, 2019).

One such practice is the formation of citation cartels, which involves collusive agreements among researchers or journals to cite each other's work disproportionately. This manipulation of citation patterns is designed to artificially inflate citation counts, thereby enhancing the perceived impact and influence of the involved parties (Franck, 1999). Citation cartels undermine the integrity of citation metrics by distorting the actual value and relevance of scholarly contributions (Fister, Fister & Perc, 2016; Perez, Bar-Ilan, Cohen & Schreiber, 2019). This practice not only skews the evaluation of individual researchers but also has broader implications for the academic community, where citation counts are often equated with research quality (Aksnes, Langfeldt & Wouters, 2019). The emergence of citation cartels reflects the growing pressure on researchers to achieve high citation numbers, which are increasingly linked to career advancement, grant success, and institutional prestige (Fong & Wilhite, 2017). As citation counts become a dominant metric of academic success, some researchers and journals resort to unethical tactics to maintain competitiveness in an environment where



academic recognition is closely tied to citation performance (Dougherty & Horne, 2022; Mutti, 2023). This has led to a situation where citation metrics, rather than an objective measure of research impact, are exploited to create a false narrative of scholarly influence (Fister, Fister & Perc, 2016; Perez, Bar-Ilan, Cohen & Schreiber, 2019). The proliferation of citation metrics as a primary measure of academic success has significantly shaped behaviours and practices within the scholarly community (Garfield, 2006). While citation counts are intended to reflect the impact and relevance of research, the increasing pressure to achieve high citation numbers has given rise to unethical practices, such as citation cartels (Franck, 1999). Citation cartels—where groups of researchers or journals engage in mutually beneficial citation exchanges—artificially inflate citation counts, undermining the integrity of academic evaluation systems (Fister, Fister & Perc, 2016; Kojaku, Livan & Masuda, 2021). This phenomenon distorts the perceived quality of research and has far-reaching implications for the credibility of educational institutions, funding allocations, and career advancements (Larivière & Sugimoto, 2019). Given the critical role of citations in academic recognition and the evaluation of scholarly work, it is imperative to understand and address the impact of citation cartels on the academic world. This study seeks to explore the mechanisms, motivations, and consequences of citation cartels, offering insights into how they affect the landscape of scholarly communication and suggesting potential strategies for mitigating their adverse effects (Fong & Wilhite, 2017; Sugimoto & Larivière, 2018).

Citation metrics have become a cornerstone in evaluating academic research and influencing decisions related to funding, tenure, and publication opportunities. However, the integrity of these metrics is increasingly compromised by the emergence of citation cartels—collusive networks of researchers or journals that systematically cite each other's work to inflate citation counts artificially. This manipulation of citation data seriously threatens the fairness and accuracy of academic evaluations, leading to the unwarranted elevation of certain research works and the marginalisation of others. Despite its growing prevalence, the phenomenon of citation cartels remains underexplored, particularly in terms of its broader impact on the academic community and the quality of scholarly communication. This research study aims to offer a thorough overview of citation cartels, examining their emergence, the mechanisms through which they function, and their broader implications for the academic community.

2. LITERATURE REVIEW

A citation cartel is a form of academic collusion in which researchers or journals engage in systematic, mutual agreements to inflate citation counts artificially. This manipulation involves coordinated efforts to disproportionately cite each other's work, often irrespective of its relevance or quality, to enhance the perceived impact and influence of the involved parties' publications (Franck, 1999; Fong & Wilhite, 2017). Such practices undermine the integrity of citation metrics by distorting the true measure of scholarly contributions and can significantly impact research evaluation, funding decisions, academic reputation and ranking and ratings of academics (Brembs, Button & Munafò, 2013; Teixeira da Silva, 2021). The emergence of citation cartels is closely linked to the increasing reliance on quantitative metrics for evaluating academic performance, particularly citation counts (Franck, 1999; Fister, Fister & Perc, 2016; Kojaku, Livan & Masuda, 2021). As these metrics became a dominant measure of research quality, the pressure on scholars to achieve high citation numbers intensified, leading to the manipulation of citation practices (Hirsch, 2005). Some researchers and journals began exploiting the system by forming citation cartels—collusive agreements designed to inflate citation counts and enhance their publications' perceived impact and credibility (Wilhite & Fong, 2012; Joshi & Pandey, 2024). Digital platforms and online databases have further facilitated the formation and coordination of these cartels, making it easier for groups to monitor and track

citations systematically. Citation cartels operate through various mechanisms, each contributing to the artificial inflation of citation counts; Figure 1 below depicts different types of Citation cartels. One common tactic is the establishment of mutual citation agreements, where researchers agree to cite each other's work in future publications, regardless of its relevance (Held, 2019). Another mechanism involves journal editorial policies that encourage or mandate citations to articles published within the same journal, thereby boosting the journal's impact factor (Larivière & Sugimoto, 2019; Malan, 2022). Special issues and conferences can concentrate citations among specific authors, subtly distorting the academic record and masking these practices as legitimate scholarly collaboration (Kojaku, Livan, & Masuda, 2021).

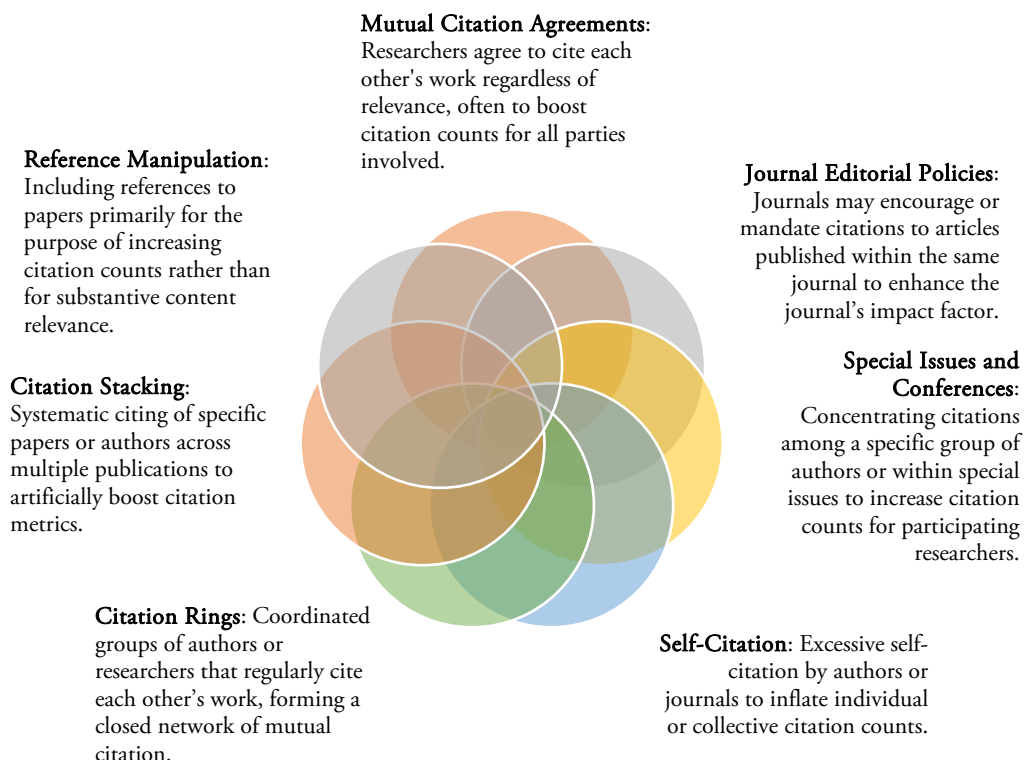


Figure 1: Different types of Citation cartels

The impact of citation cartels on academic integrity is profound. By artificially inflating citation counts, these cartels distort the perceived influence of individual researchers and journals, leading to misinformed decisions by key stakeholders such as funding bodies, hiring committees, and promotion boards (Fong & Wilhite, 2017). This, in turn, perpetuates a cycle of unmerited academic advancement, eroding trust in the research evaluation process and undermining the true value of scholarly work (Teixeira da Silva, 2022). The long-term consequences of this practice include a diminished credibility of academic research and a compromised foundation for knowledge dissemination (Ioannidis, 2018). The effects of citation cartels extend beyond academic integrity, influencing research quality and the broader landscape of scholarly communication. The concentration of citations among a select group of researchers marginalises other scholars, including those conducting equally important work, thereby skewing the academic discourse (Sugimoto & Larivière, 2018). This distorted citation distribution can stifle innovation and reduce the diversity of perspectives within academic discussions (Merton, 1968; Teixeira da Silva, 2022).

Moreover, it creates barriers for early-career researchers and those from underrepresented regions or disciplines, who may struggle to compete with the inflated citation records of cartel members (Horta & Santos, 2016). Addressing the issue of citation cartels requires a multi-faceted approach, combining technological, procedural, and cultural changes. One potential solution is developing and implementing algorithmic detection systems capable of identifying suspicious citation patterns, thus bringing these unethical practices to light (Oravec, 2023). Additionally, strengthening the peer review process by encouraging reviewers to critically assess the relevance and legitimacy of citations in submitted manuscripts can help mitigate the influence of citation cartels (Resnik & Shamoo, 2011). Transparency and disclosure are essential for promoting ethical practices in academia. Mandating that authors reveal any potential conflicts of interest related to citations can help create a more ethical scholarly environment (Borgman, 2007). Academic institutions and funding bodies must reconsider their reliance on citation metrics as the primary measure of research quality, adopting a more holistic approach that values the diversity and integrity of scholarly contributions. Table 1 below provides definitions for key concepts in the evaluation and integrity of academic research:

Table 1. Definitions of Key Operational Concepts in Research Evaluation

Operational Concept	Description	Source
Citation Metrics	Quantitative measures are employed to assess the impact and influence of research.	Garfield, 2006; Fong & Wilhite, 2017
Research Integrity	Adherence to ethical standards in both conducting and reporting research.	Ioannidis, 2018; Resnik & Shamoo, 2011
Scholarly Influence	The effect of a researcher's work on the academic community and literature.	Sugimoto & Larivière, 2018; Merton, 1968
Unethical Practices	Actions that compromise the integrity of academic research and publication.	Franck, 1999; Teixeira da Silva, 2022
Publication Patterns	Trends and regularities in how research are published and cited.	Finardi, 2014
Impact Factor	A metric that measures the average frequency with which articles in a journal are cited.	Larivière & Sugimoto, 2019; Malan, 2022

3. Methods

This study employed a descriptive case study research design to explore the phenomenon of citation cartels within a specific academic journal. The case study approach was selected for its suitability for in-depth examination of complex and context-specific issues (Cresswell, Robertson et al., 2011; Hollweck, 2016; Crowe, Priya, 2020). The focus was identifying potential citation cartel behaviour by analysing citation patterns across a set of published papers within the journal. A convenience sampling method was utilised, wherein six papers were published research paper in a peer-reviewed journal, which is also cross-referenced to good scholars (Scholtz, 2021). This sampling method was selected due to the accessibility and availability of articles that met the study's criteria (Etikan, Musa & Alkassim, 2016). The first criterion for selection was that at least one author in each of the papers was cited more than five times within the same article. This threshold was set to identify potential patterns of excessive citation that might indicate a deliberate effort to inflate citation counts (Wilhite & Fong, 2012; Joshi & Pandey, 2024). The second criterion involved the thematic analysis of the selected papers; papers were chosen where the cited works appeared to be unrelated or only marginally related to the paper's central theme. This lack of thematic coherence was a possible indicator of biased citation practices aimed at artificially boosting the citation metrics of one or more authors involved (Garfield, 2006; Brembs, Button & Munafò, 2013; Fong & Wilhite, 2017; Teixeira da Silva, 2021). The selected papers were then systematically analysed to assess the citation patterns, with particular attention paid to the frequency of self-citation and cross-citation among the authors.

The analysis also considered the cited works' relevance to the papers' main themes, evaluating whether the citations appeared to serve a legitimate scholarly purpose or were included primarily to enhance citation counts (Saleem, Dhuey, White et al., 2023; Worrall & Cohn, 2023).

The findings from this analysis were used to identify potential instances of citation cartel behaviour and to discuss their implications for the integrity of academic research and publication practices. The selection criterion for the review period was determined by the publication dates of the included papers, emphasising the most recent research trends and developments. Only papers published within the last two years were considered to ensure the inclusion of recent advancements, with the selected documents spanning from February 2022 to August 2024. This timeframe enables a comprehensive analysis of the latest research while providing a balanced view of contemporary findings.

4. RESULTS AND DISCUSSION

The citation analysis of the selected papers highlights the influence of specific authors and their collaborative efforts (Table 2). Paper 1, published in May 2022, has 37 citations, with significant contributions from Author 1 and 2. Paper 2, published in February 2022, shows a slightly higher citation count of 38, again highlighting the contributions of Author 1 and Author 3. Paper 3, from March 2022, has 29 citations, with key contributions from Author 1 and Author 3. Paper 4, published in May 2024, stands out with the highest citation count of 49, notably influenced by Author 1 and Author 5. This paper also shows significant contributions from Author 4, demonstrating a collaborative impact on recent research. Paper 5, released in August 2024, matches Paper 1's citation count 37, with notable citations from Author 1 and Author 2. Paper 6, also published in May 2024, has 37 citations, similar to Paper 1 and Paper 5, with key contributions from Author 1 and 3. A notable observation is the consistent presence of Authors 1 to 4 as co-authors across several papers. Specifically, Author 1 and Author 3 have co-authored Papers 1, 2, and 3, while Author 1 and 5 have contributed significantly to Paper 4. This pattern of co-authorship underscores their collaborative role in advancing research in the field and reflects their combined impact on the citation counts of these publications.

Table 2. Citation Analysis and Co-Authorship of Selected Papers

	Paper 1	Paper 2	Paper 3	Paper 4	Paper 5	Paper 6
Autor 1	37	38	29	37	19	37
Autor 2	17	12	12	13	11	17
Autor 3	17	13	13	13	9	13
Autor 4	5	5		5	3	6
Autor 5	3	3	3	6	3	4
Autor 6	3	5	5	5		2
Autor 12	2	2	2	4	2	1
Total number of citations	37	38	29	49	37	37

In four of the five papers analysed, Author 1 was cited in every reference as the sole author or a co-author. This resulted in Author 1 being directly or indirectly responsible for 100% of the citations in these papers (Figure 2). Similarly, Author 2 accounted for a median of 36% of the citations across all six papers, demonstrating a significant presence in the cited works. Author 3, on the other hand, contributed to a median of 35% of the citations across the same set of papers, highlighting their substantial influence. This distribution of citations underscores the pivotal role of these authors in the research domain covered by the papers.

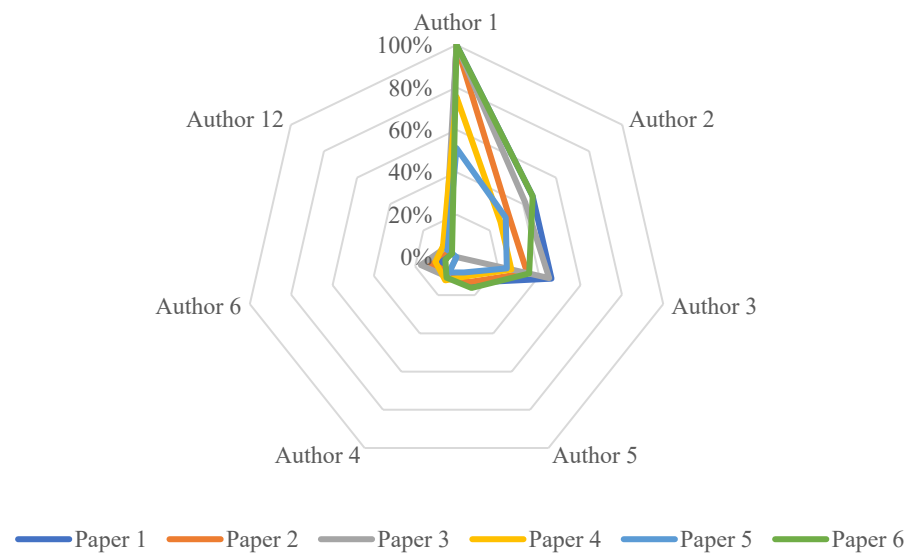


Figure 2. Citation Distribution and Influence of Key Authors Across Papers

5. DISCUSSION

Citation metrics have become a cornerstone in evaluating academic research and influencing funding, tenure, and publication decisions (Garfield, 2006). As citation counts have grown in importance, their manipulation through practices like citation cartels has surfaced, posing significant challenges to academic integrity (Franck, 1999; Teixeira da Silva, 2022). This study explored the presence and impact of citation cartels, revealing both the subtlety and breadth of such practices in shaping research evaluations. The analysis of the citation patterns in the selected papers highlighted a notable concentration of citations among a few key authors. Specifically, Author 1 was cited in every reference across four of the five papers analysed as the sole author or a co-author. This resulted in Author 1 being directly or indirectly responsible for 100% of the citations in these papers. Similarly, Author 2 and 3 were prominent in the citation landscape, accounting for median percentages of 36% and 35% of the total citations, respectively. This pattern underscores a high level of collaboration among these authors and raises concerns about potential citation cartels. The consistent presence of Authors 1 through 4 as co-authors across multiple papers suggests a deliberate strategy to amplify their citation counts. For instance, Author 1 and Author 3 co-authored Papers 1, 2, and 3, while Author 1 and Author 5 collaborated significantly on Paper 4. Such patterns indicate a potential cartel-like behaviour where mutual citation agreements enhance perceived scholarly impact.

This concentrated citation distribution not only skews the actual value of research contributions but also potentially marginalizes other significant work within the field (Sugimoto & Larivière, 2018). Addressing the issues raised by citation cartels requires a multifaceted approach, including the implementation of algorithmic detection systems to identify suspicious citation patterns and a more rigorous peer review process to assess the relevance of citations (van Noorden, 2010; Resnik & Shamoo, 2011; Kojaku, Livan & Masuda, 2021). Additionally, fostering transparency in citation practices and reconsidering the heavy reliance on citation metrics for academic evaluation can help mitigate the adverse effects of such unethical practices (Wouters et al., 2019).

The study's scope is a notable limitation, as it may be restricted to specific research or disciplines, potentially affecting the generalizability of the findings to other fields or research areas (Hirsch, 2005). Additionally, data constraints pose a challenge; the study's reliance on secondary data sources may

introduce biases or inaccuracies, impacting the reliability of the results (Garfield, 2006). The chosen research methodology also presents limitations; for instance, a focus on quantitative approaches might overlook qualitative aspects of the research environment (Fong & Wilhite, 2017). Temporal constraints further limit the study, as the time frame of the research might exclude recent developments or emerging trends in the field (Teixeira da Silva, 2019). Finally, the diversity of participants or case studies involved in the research may be limited, potentially restricting the applicability of the findings to broader populations (Sugimoto & Larivière, 2018).

There are various instruments available to assess human quality of life. To measure health-related quality of life, one commonly used tool is the Short Form Health Survey 36 (SF-36). This assessment consists of 36 questions that cover eight scales related to health functions and well-being scores, including physical limitations, physical functioning, emotional control, energy-fatigue, social functioning, mental health, general health, and bodily pain. This instrument was originally written in English and has been adapted into various languages, including Indonesian. (Putri, et al., 2021) Another widely used tool in research is the WHOQOL-BREF, which includes 24 facets across four domains to help measure an individual's quality of life. These four domains are: i) physical health, consisting of 7 questions; ii) psychological, consisting of 6 questions; iii) social relationships, consisting of 3 questions; and iv) environment, consisting of 8 questions. WHOQOL-BREF also measures 2 facets of overall quality of life: i) overall quality of life and ii) general health. (Salim, et al., 2007).

6. CONCLUSION

Citation cartels represent a serious threat to the academic world, undermining the integrity and fairness of research evaluation. As the academic community addresses these issues, it is essential to develop effective mechanisms for detecting and mitigating citation cartels while fostering ethical research practices. Only through collective efforts can the scholarly community restore trust in the citation system and ensure that research is evaluated on its true merit.

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