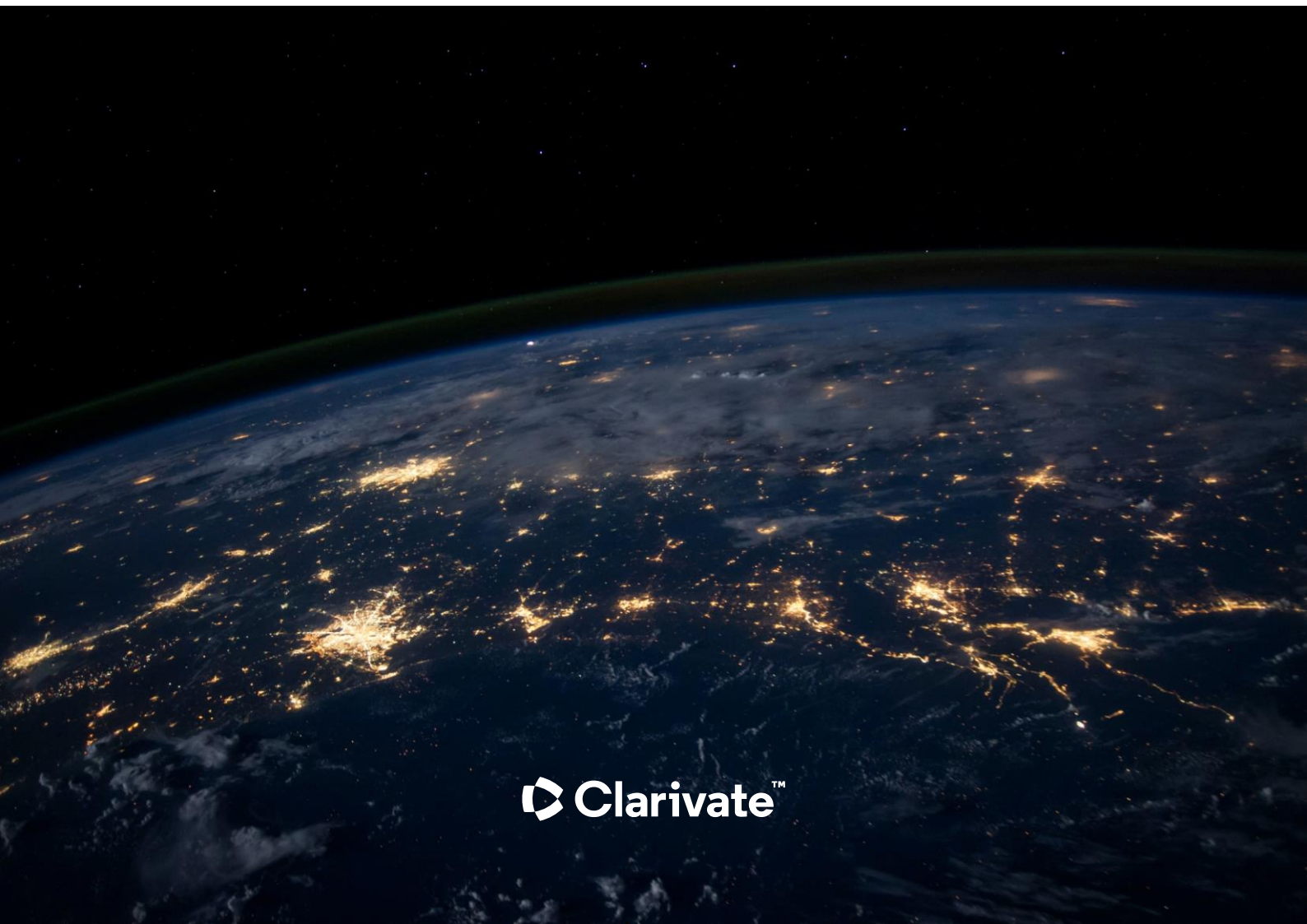


Unlocking the efficiency of international research collaboration

A new intelligence solution for informed
decision-making and policy planning

February 2025

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About the Institute for Scientific Information

The Institute for Scientific Information at Clarivate has pioneered the organization of the world's research information for more than half a century. Today it remains committed to promoting

integrity in research while improving the retrieval, interpretation and utility of scientific information. It maintains the knowledge corpus upon which the Web of Science index and related information and analytical content and services are built.

It disseminates that knowledge externally through events, conferences and publications while conducting primary research to sustain, extend and improve the knowledge base.

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About ISI Insights

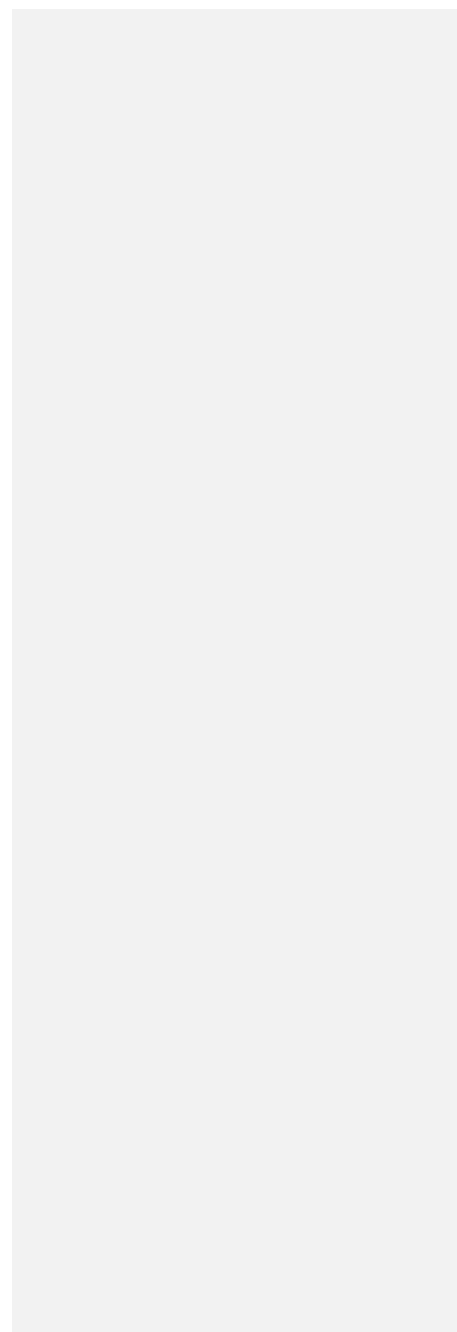
ISI Insights is a series of analyses from the Institute for Scientific Information. Each paper offers an informative analysis of topical research trends, using best-in-class citation data and analytics from Clarivate.

This paper introduces Collaboration-CNCI (Collab-CNCI) – a new suite of indicators within InCites, developed by the Institute for Scientific Information at Clarivate, to offer deeper, data-driven insights into the true impact of global research partnerships.

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Contents

- 1 Executive summary
- 2 Introduction
- 3 What are the data?
- 4 Impact Profiles reveal skew
- 5 International collaboration improves impact
- 6 Deconstructing research collaboration
- 7 Examples & applications
- 8 Conclusion and key insights



1. Executive Summary

Sound research management needs to be based on decisions and actions that are supported by reliable information. Research impact underpins wealth creation and enhances quality of life, yet many impact assessments suffer from the consequences of misinterpreted and poorly presented data. Consequently, research impact comparisons between countries and between institutions are inadequate. This report proposes solutions to improve assessments amid rising international research collaboration, thereby facilitating more informed decision-making and investment planning.

Citation-based academic impact indices extracted from the Web of Science correlate with peer judgments on academic achievement and inform research management and policy planning. However, an over-reliance on citation impact indicators without an analysis of underlying data distribution can be misleading and prone to misinterpretation.

There is a significant warning here: by avoiding a broader, underlying examination of data on international collaboration, there is a risk of taking the wrong path. To ignore the positive effect of international collaboration on citation performance can lead to misguided conclusions around the beneficial influence of research assessment on academic performance, resulting in ineffective policy decisions. This report identifies such pitfalls and proposes improved methodologies to aid accurate interpretation and effective research management.

By addressing these challenges and refining methodologies, stakeholders can better assess the true impact of research programs, strengthening decision-making and optimizing more efficient resource allocation for societal progress and well-being.

- More than half the publication output of countries and institutions has an average Category Normalized Citation Impact (CNCI) that is markedly less than the simple national average CNCI. This is due to skewed research activity distributions. Impact Profiles expose the true distribution of CNCI, better reflect the balance of low and high values, and enable comparisons between organizations and across time **(Figure 1, Figure 2)**.
- Since the 1990s, the relative frequency of internationally collaborative publications has risen from less than 10% to over 50% of output for G7 countries. This has driven national CNCI upwards, to converge on similar values, because collaborative papers more highly cited than domestic **(Figure 3)**.
- The citation impact of domestic papers (with no international co-author) and collaborative papers has changed little over a long period for major economies despite the evidence that national average citation impact has risen. This is because the changing balance, shifting the portfolio towards the more highly cited international output, has shifted the average within the mix without changing the separate components **(Figure 4)**.
- A new metric, Collaboration CNCI (Collab-CNCI), distinguishes high-performing domestic research from collaboration-dependent work. For example, U.K. domestic research, though less cited than its multilateral work, outperforms other countries' domestic output. Collab-CNCI aids research funding and regional investment strategies. These findings are critical in managing research funding and strategic regional investment **(Table 1, Figure 5, Figure 6)**.

2. Introduction

Research investment needs well-founded, accurate information to enable informed decision-making. In this report, we focus on information about international research collaboration. This has become increasingly important to research management. Collaboration across borders was rare in the 1980s, then grew rapidly during the 1990s and, in the 2000s, changed from bilateral to multilateral through global networks. Collaboration now accounts for much of the highest impact and most innovative research, and it is led by the most highly esteemed research organizations.

It is of concern, therefore, that both public and policymakers have been informed by poorly interpreted and unduly positivist descriptions of their country or institution's real research impact. Analyses recently developed by Clarivate shows that much better analysis on international collaboration is needed to direct research investment and maximize its impact. In this report, building upon previous developments described in 2019 and 2023, we explain routes to acquire these insights. The new presentations of bibliometric data shed light on the underlying impact of research and provide actionable steps for researchers and research managers.

3. What are the data?

Strategic and policy reports on research often lean on citation impact, usually distilled into a single-point metric, such as an average to indicate research quality. Such simplistic metrics fail to interpret what is always the real spread of 'research performance'. Research is a complex landscape; outcomes are influenced by many factors; and activity distributions tend to be highly skewed. A more detailed examination can unpack the data obscured by a metric. This will improve – and may significantly alter – interpretation affecting research management and policy¹.

Citation counts reflect the influence on later publications of earlier journal articles and reviews (academic papers) and are conventionally used to index the 'impact' of academic research. However, a simple citation count is meaningless, as papers published in academic journals by different groups, institutions or countries vary significantly in their attributes.

Reviews tend to receive more attention and citations than standard articles; the age of a paper affects its citation count as older papers have had more time to accumulate citations; and the rate of that citation accumulation is discipline dependent. For example, papers in the life sciences are usually shorter, more densely referenced and more frequently cited than papers in engineering.

Each paper's citation count is 'normalized' to factors such as the year of publication, the subject category of journal, and the document type. This is referred to as Category Normalized Citation Impact (CNCI) and is used to provide proper comparability in the assessment of research impact².

International collaboration also plays a role in determining the attention a publication receives, but this has not previously been accounted for. Collaboration draws on intellectual, financial and physical resources across organizations and its costs are justified only when projects are associated with cutting-edge challenges. Work of this kind is then likely to generate higher citation counts as well as reflecting engagement with a broader audience.

Some analysts have attempted to 'adjust' innately higher counts by fractionally distributing both publications and their citations across collaborating countries, but this disguises the effect and its outcome. It also arbitrarily and covertly distributes the indicator data.

Clarivate has developed a robust and transparent new methodology to analyze the influence of collaboration without masking the impact values of individual papers³. This new indicator – Collaboration-CNCI (Collab-CNCI) – allows citation impact to be sub-divided with respect to domestic research (with only national authors) and international collaboration (with authors from two countries – bilateral – or more – multilateral). Collab-CNCI thus considers the publication portfolio in terms of its authorship types and then compares like-with-like to establish whether a paper is one that is well cited of its type: i.e., 'is this a good domestic paper compared to other domestic papers?'

4. Impact Profiles reveal skew

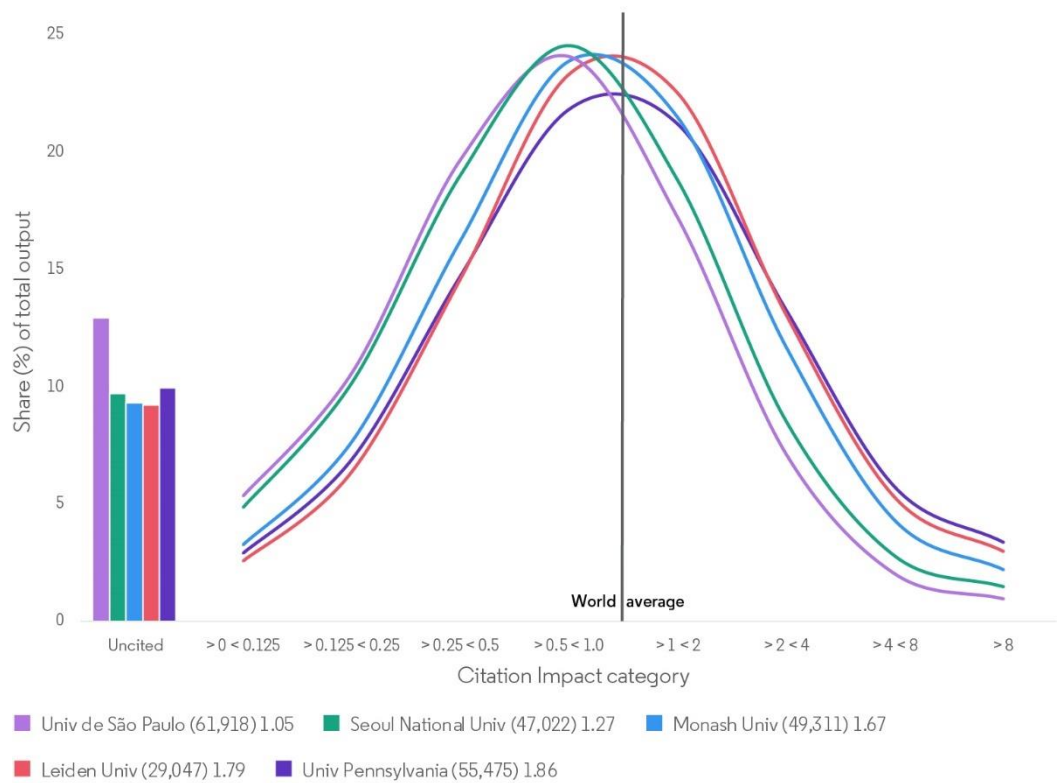
Research activity is universally skewed. There are always many relatively low values and a few instances of very high values, whether we consider group size, research income, publication output or average citation rates. So, contrary to common perception, 'average impact' does not represent the mid-point, or median value, above and below which half the data points lie. A graph is needed to reveal the true distribution.

In 2006, we pioneered Impact Profiles, a novel approach to visualizing citation analysis through distribution profiles. For example, while the average citation impact of United Kingdom (U.K.) research output may surpass world average, analysis shows that more than half was cited less often.⁴ Impact Profiles represent the full citation impact spectrum of papers in a dataset using the global average CNCI (by definition, equal to 1.0) as a reference point. A smoothed curve, akin to a normal (bell-shaped) distribution, links the data points.

Figure 1 visualizes the Impact Profiles of five universities in different global regions, showing the citation impact spread of their journal output over a five-year period. The table tells us that each had an average CNCI above the world benchmark, but their graph shows that their profiles consistently peak below that average. Most output for most institutions is cited less often than world average and as many as 10% of papers remain uncited.

Impact Profiles facilitate a detailed interpretation of CNCI analyses and enable research managers to pose additional questions. How do we differ from comparator universities? Is the spread of impact similar in all parts of the organization? Is it common to all activities? Which parts of the overall profile are contributing to the headline result? Later in this report we will see that collaborative research will sit in the more highly cited part of the curve.

Figure 1: Impact Profiles for recent journal publications for five global universities. The data cover articles and reviews published in journals indexed in Web of Science from 2018-2022. The total output and the average CNCI for each university over that period is shown in the legend.



Impact Profiles can also throw light on issues such as progress. For example, the research capacity and output of Mainland China has expanded massively accompanied by surging excellence. Analysing successive five-year Impact Profiles evidences a progressive shift from a relatively high percentage of low cited papers towards an increasing volume and percentage of papers above world average: a five-fold expansion in absolute volume since 2000, from fewer than 25,000 to almost 127,000 papers within a five-year period.

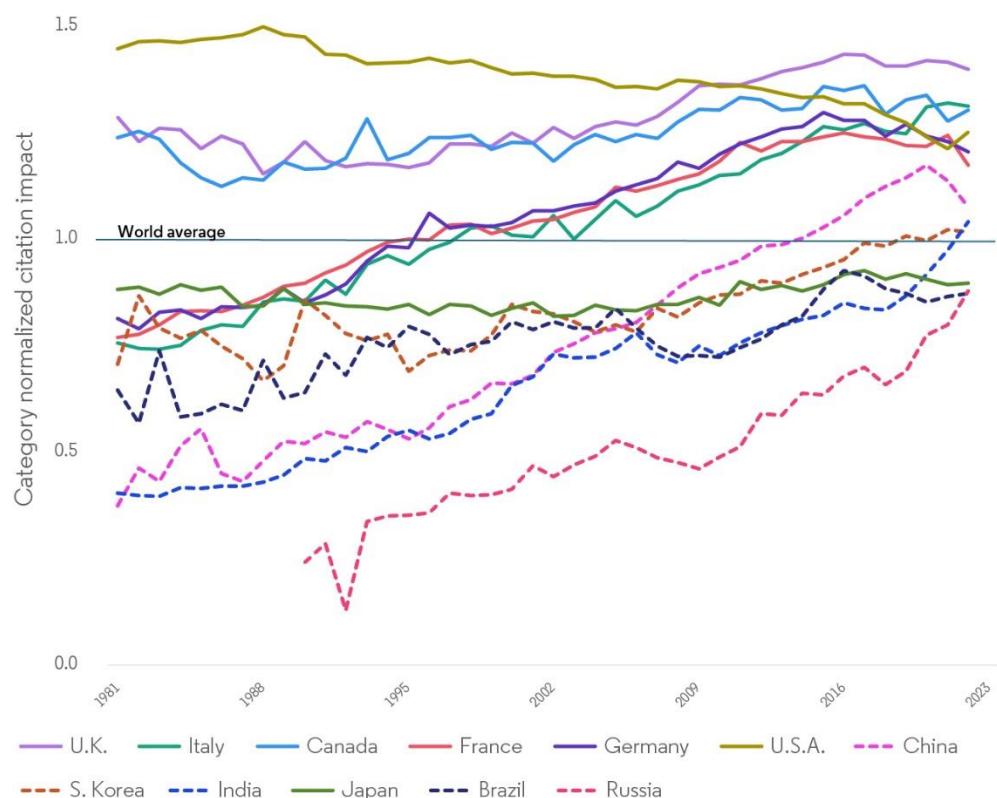
5. International collaboration improves impact

International co-authorship is, as noted, an increasingly important part of research activity and features in both institutional strategies and national policies. For more than two decades it has been widely understood that papers with multiple authors tend to attract more citations than those authored by individuals⁵.

National citation impact across G20 nations has risen in line with rising international engagement. Why might the average citation count rise further with a shift from bilateral to multilateral collaboration? Countries often prioritize their own interests and handle their internal affairs independently. However, when issues are significant and transcend national boundaries, international cooperation becomes necessary. International collaboration raises that stake further and it produces higher average citation counts. It may also be true that there is artefactual boosting of citation counts because multiple audiences have their attention drawn to the work. Whatever the causes, they interact with policy and outcomes, because there has long been explicit promotion of international collaboration.

One policy implication is that the effect of collaboration undermines the influence of research policies. For example, the rise in average citation impact of U.K. research publications over the last quarter century might be attributed to its national research assessment policy. However, the U.K. research portfolio is now less purely domestic and more heavily engaged with a highly cited and innovative international collaborative network. The trajectory of U.K. CNCI does, in fact, mirror that of neighbours with different research investment and assessment policies and practices (**Figure 2**).

Figure 2: The annual average CNCI of major research producing countries across 40 years, analyzed from citation data for articles and reviews published in journals indexed in the Web of Science that had at least one author from that country. CNCI can be seen to rise for the majority.



Despite global variations in national research policies, CNCI consistently rose alongside the expansion of collaboration, evidencing the universal influence of collaborative efforts on research impact. Unless we understand the indicators and the specific data that feed into institutional datasets, country sets and the global benchmark, our interpretation may be seriously awry. Merely possessing an average CNCI that is evidently above world average is not as significant as presumed, if everybody else *also* exceeds the world average.

6. Deconstructing research collaboration

Data for domestic and for internationally collaborative research can be separated. A surprising finding of Clarivate's recent work is that this reveals that the average citation impact of each data subset changed very little over forty years. What has altered are the proportions of these subsets within the national total.

To explore the effect of changes in collaboration on net outcomes for the research base, the domestic and international pools of research output are deconstructed and analyzed separately. Extensive analyses conducted for the G20 countries have shown a broadly similar and synchronous pattern. Initially bilateral, collaboration became increasingly multilateral during the early 2000s, leading to a general increase in research subject diversity for each country and a convergence among G7 nations towards similar portfolios and distinct but again similar portfolios among leading emergent nations.⁶

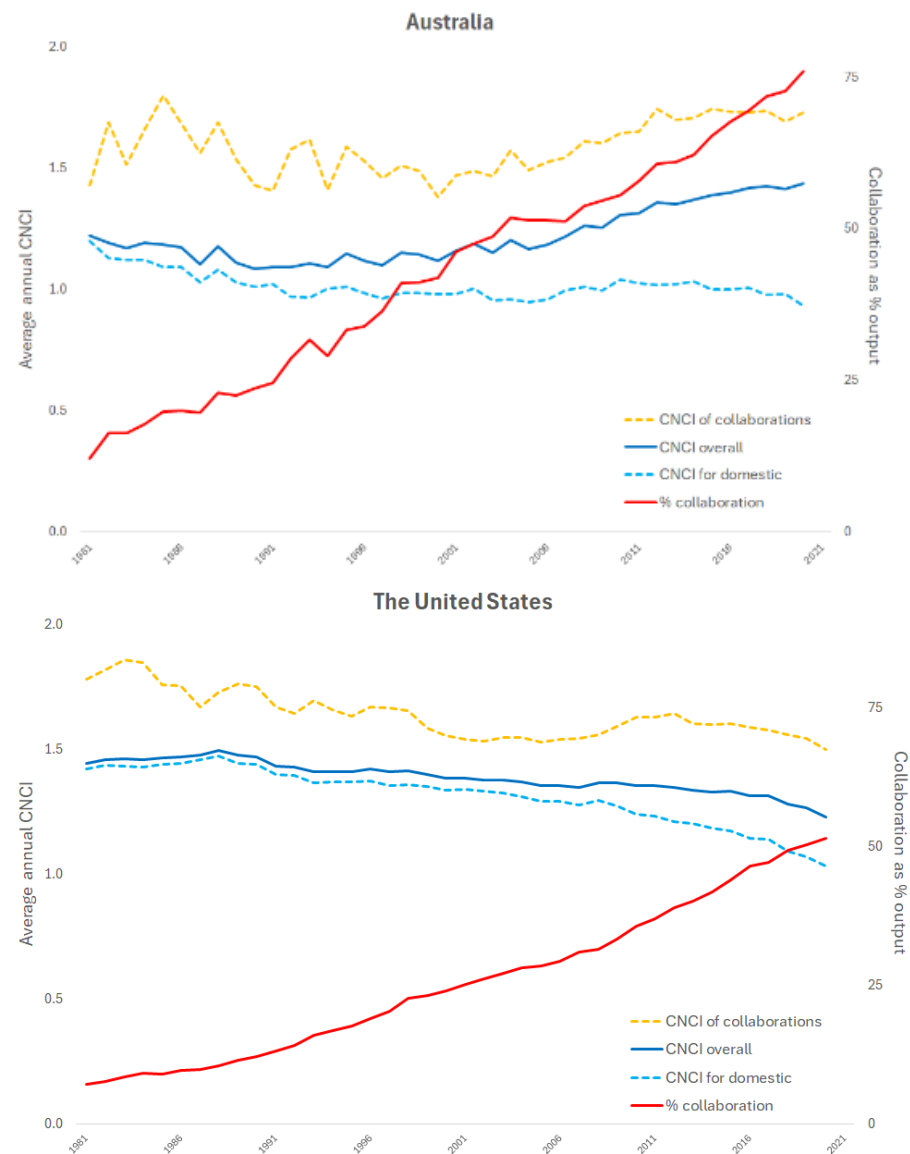
In the next section we delve deeper into this analysis and explore more effective methods for assessing the relative quality of the separate domestic and collaborative modes.

Data for total, collaborative and domestic papers can be tracked and visualized. For G7 countries, the volume of domestic papers often remained relatively stable after 1990 and most growth stemmed from international collaboration.⁷ This means that national portfolios evolved from mostly domestic to mostly international. However, we find that although the average CNCI for collaborative papers is indeed higher, its index value changed very little. In contrast, the CNCI of purely domestic papers (with no international co-authors) actually fell in some countries.

We need to reinterpret what has been seen as a significant rise in average CNCI. The data suggest that the average citation impact of the subsets of publication types did not change significantly and that the primary driver of change was in fact the balance of national and collaborative activity.

For Australia, the average impact of internationally collaborative research has exhibited fluctuations but not evidently risen over the period. For the U.S., it has fallen. Domestic CNCI dropped for both, but more severely for the U.S. Overall, therefore, this confirms that changes in national average CNCI are predominantly driven by the balance of domestic and international papers. Specific national policies regarding research assessment seem to make no difference to the outcome.

Figure 3: Trends in annual impact of domestic and internationally collaborative research for Australia and the United States



Left hand axis: the average annual CNCI for all papers; CNCI for purely domestic papers; CNCI for papers with an international co-author

Right hand axis: the annual percentage of papers that have an international co-author

We can now explain how average citation impact has risen, due to the mix of papers, while the impact of their domestic and collaborative research has not changed. From a management and policy perspective these pieces of information are indispensable for drawing informed and sensible conclusions about policy decisions and future strategic investment. They also direct us to additional management considerations and inform discussion with researchers.

In the next section we delve deeper into this analysis and explore more effective methods for assessing the relative quality of the separate domestic and collaborative modes.

7. Examples and applications

Although the following analysis can be performed at any level (researcher, department, organization, country/region), it is more straightforward and intuitive to explain the benefits of analysis by collaboration type using macro-level entities such as countries/regions.

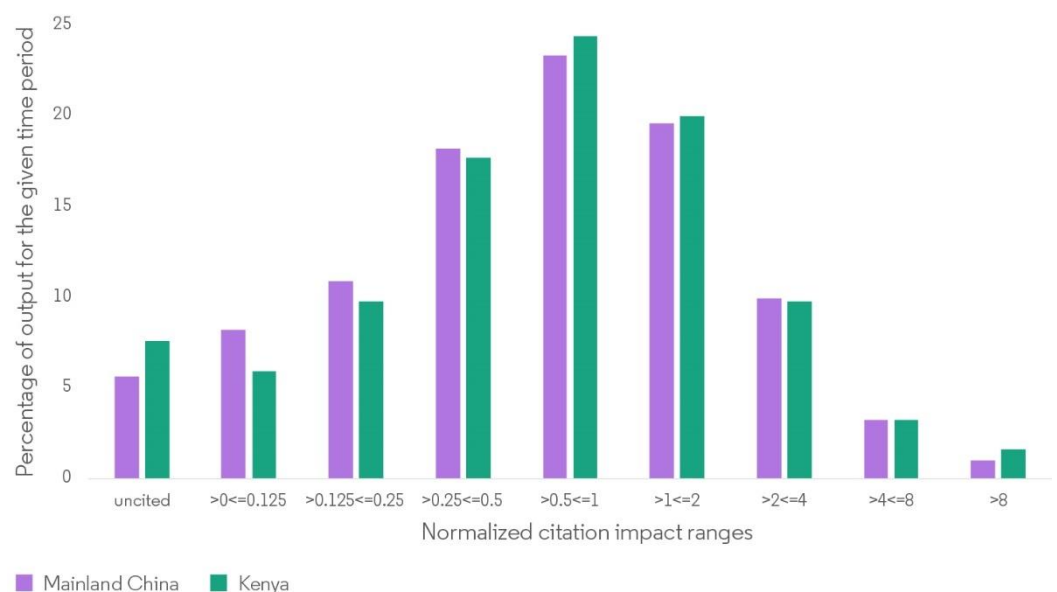
Let's consider pools of articles sourced from the Web of Science Core Collection for 2013-2022 and take Mainland China and Kenya as exemplar locations, of interest due to the marked contrast in their national average 'standard' CNCI values.

'Standard' CNCI

Kenya (average CNCI is 1.44) has a much higher value than larger African research economies such as South Africa (1.16) and Egypt (1.06). Its average CNCI is also greater than that of Mainland China, which has only recently risen above world average to 1.12.

Impact Profiles built on average CNCI values for both countries/regions do not explain the phenomenon (Figure 4): Kenya has a higher share of uncited articles, Mainland China has higher shares of low cited articles (CNCI < 0.5), and Kenya has more highly cited articles (CNCI > 0.5), especially extremely highly cited ones (CNCI > 8).

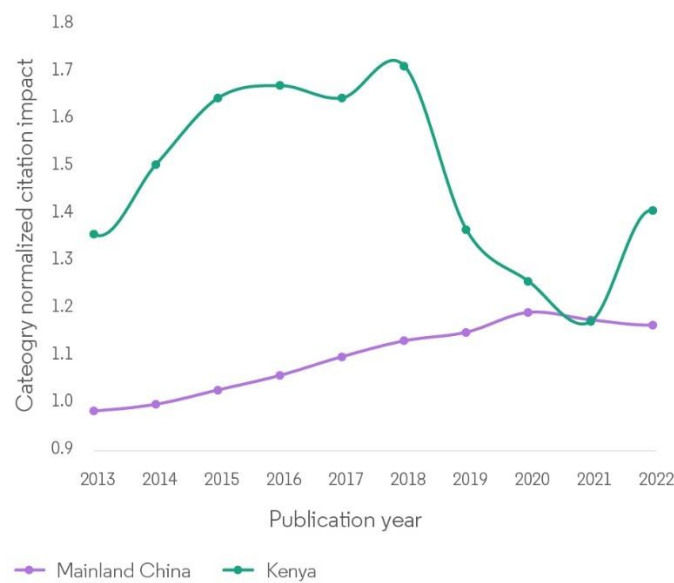
Figure 4: Impact Profiles of 'standard' CNCI values for Mainland China and Kenya (documents of article type, published in 2013-2022, Web of Science Core Collection)



So, what drives such a big difference in citation impacts between these two economies? And how secured is this momentum's strength of Kenya longer term?

To answer these questions, let's start with a CNCI trend analysis. As can be seen in Figure 5, Mainland China's 'standard' CNCI is growing steadily by year, with a slight decline in the post-Covid period. At the same time, Kenya's trendline is highly volatile, ranging from 1.71 for articles published in 2018 and dropping down to 1.17 for articles published just 3 years later. Analysis of CNCI by decades would smooth these dramatic fluctuations, but still, this is a signal of some hidden factors behind Kenya's advantage in momentum.

Figure 5: Trendlines of standard CNCI values (by publication year) for Mainland China and Kenya (documents of article type, published in 2013-2022, Web of Science Core Collection)



Analysis of collaboration types

Analysis of research outputs by collaboration type rather than blended world totals⁸ is summarized in Table 1. It reveals that approximately 17% of Kenya's output is domestic while bilateral is the most common international collaboration (36%), while trilateral and quadrilateral-plus account for over 47% of articles. This latter collaboration type accrues over half of all Kenya's citations, whereas domestic research account for only around 5% of citations. Mainland China, by contrast, has a much greater (about 75%) domestic output, that garners nearly 65% of all citations – a more proportional distribution. About 19% of Mainland China's articles are internationally bilateral while trilateral and quadrilateral-plus contribute a total of 6% of articles and 10% of citations, much less than Kenya.

Table 1: Comparison of average standard and average Collaboration-CNCI, overall and by collaboration type (documents of article type, published in 2013-2022, Web of Science Core Collection). The numbers of articles reflect only those ones with collaboration type defined in Web of Science Core Collection, that may be slightly different from the overall totals.

Table 1

Mainland China					Kenya		
Articles: 4,198,916					Articles: 28,048		
CNCI		% articles	Collaboration type		% articles	CNCI	
Standard	Collab					Collab	Standard
1.12	1.11	100	Overall data set		100	0.89	1.44
0.91	1.09	33.1	Domestic	Single	8.4	0.68	0.58
1.03	1.09	42.3		Multiple	8.2	0.68	0.66
1.41	1.18	19.0	Inter-national	Bilateral	36.1	0.79	0.93
1.74	1.21	3.7		Trilateral	21.0	0.80	1.11
2.78	1.31	1.9		Quad +	26.4	1.23	2.92

Global baselines highlight the considerable challenge of establishing – and maintaining – large international research groups (quadrilateral-plus) over time. Such collaborations accounted for only about 2% of articles published globally over the period of this analysis. Similarly, articles of trilateral collaboration type are also rare, contributing (about just 4% of global research output. In contrast, bilateral collaborations are the most common among all international articles, accounting for approximately 18% of the global total. At the same time, domestic articles dominate global output and continue to form the backbone of impactful science contributions.

In this context, Mainland China’s publication trends align with this global pattern, while Kenya demonstrates a divergent scenario. The latter may be influenced by various macroeconomic factors, such as participation in international research consortia – including very large ones – focused on outreach and knowledge dissemination. Notably, analyses indicate that some countries with very small research economies and high average CNCI values often rely heavily on international collaborations for their success.

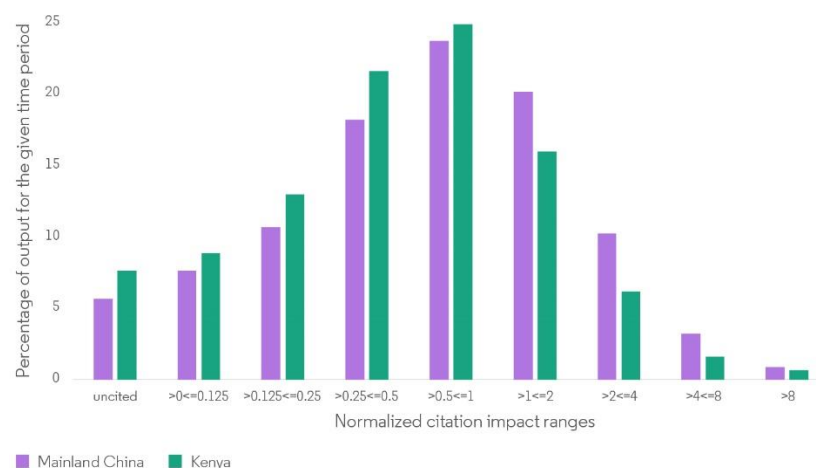
While international collaboration leads to higher citation rates² they are significantly more resource-intensive to establish and maintain. Therefore, a more pragmatic strategy for governments and institutions would be to build strong domestic research partnerships, alongside international collaborations of a manageable size (involving two to three countries/regions). Standard CNCI values calculated per collaboration type (Table 1) further supports these findings. Mainland China outperforms Kenya in all collaboration types, except for quadrilateral-plus international collaborations, where Kenya’s standard CNCI (2.92) is still higher than of Mainland China (2.78). This appears to be the main factor behind Kenya’s higher overall ‘standard’ CNCI.

Collaboration-CNCI

The application of Collab-CNCI reduces Kenya’s average national CNCI value to 0.89, placing it below world average. Although this remains slightly higher than the Collab-CNCI values for South Africa (0.85) and Egypt (0.88), it is now significantly lower than Mainland China’s national value of 1.11. Mainland China Mainland also outperforms Kenya by Collab-CNCI values across all collaboration types, including quadrilateral-plus international collaborations.

The Impact Profiles of Collab-CNCI values exhibit notable differences (Figure 6), compared to their standard CNCI versions (Figure 4). Mainland China now demonstrates a higher share of highly cited articles (CNCI > 1), including a significant share of extremely highly cited ones (CNCI > 8). In contrast, Kenya’s profile shows a greater proportion of less-cited articles (CNCI < 1).

Figure 6: Impact Profiles of Collab-CNCI values for Mainland China and Kenya (article type - documents published 2013-2022, Web of Science Core Collection).



Although Mainland China's overall Collab-CNCI value (1.11) appears very similar to its standard CNCI value (1.12), these metrics should not be compared directly. Expected citation rates, used in CNCI formula – factoring in given publication year, document type, subject category and now collaboration type are likely to rise for international collaboration types and fall for domestic ones. This adjustment will likely lead to lower overall CNCI averages for institutions or countries, due to the traditionally higher volumes of international citations. Nevertheless, both Collab-CNCI and standard CNCI provide valuable insights into how far a paper, institution, a country/region (or any other entity) deviates from the expected citation rate, now adjusted for collaboration type.

For example, Kenya's Collab-CNCI value for trilateral international collaborations (0.80) is significantly below the global average level, while its 'standard' CNCI value for the same collaboration type (1.11) exceeds global average. This discrepancy reflects the following: Kenya's same 'international trilateral' articles, when benchmarked using Collab-CNCI, are compared against a higher citation norm, as the expected citation count for an 'international trilateral' article is inherently higher than that for articles across all collaboration types (where the expected value is influenced by the lower citation rates of domestic papers).

Similar logic explains why Mainland China's Collab-CNCI for 'domestic single' papers (1.09) is higher than its 'standard' CNCI value for the same type (0.91). The expected citation count for a 'domestic single' article is inherently lower than the articles of all collaboration types (where the expected value is influenced by higher citation rates of international papers).

Beyond averages in aggregated CNCI values

An average value metric for a country/region or an institution does not reveal the distribution of citation impact, which would help us to interpret the highs and lows within each collaboration type. We need visualization to aid interpretation.

An effective way to illustrate the range of normalized citation indicator values, which can reach into the thousands, is offered by 'box and whisker' plots. The 'box' represents the interquartile range, encompassing data between the 25th and 75th percentile, where the 50th percentile is the central or median value; the 'whiskers' extend to 1.5 times the interquartile range beyond the 75th percentile value, while any individual points above this threshold are statistically classified as outliers.

Examining the spread of CNCI values for four universities from different global regions (Brown University, U.S.; King Abdulaziz University, Saudi Arabia; Sichuan University, Mainland China and Utrecht University, Netherlands) illustrates how the range, medians and average citation impacts differ by domestic and international collaboration types (Figure 7). As collaboration becomes increasingly multilateral, both the median (horizontal black line within the 'box') and mean (white square) CNCI values steadily increase. This trend mirrors the country-level analysis, bar a notable jump in the mean between international trilateral and quadrilateral-plus collaboration values, which exceeds the interquartile range for three of the four institutions.

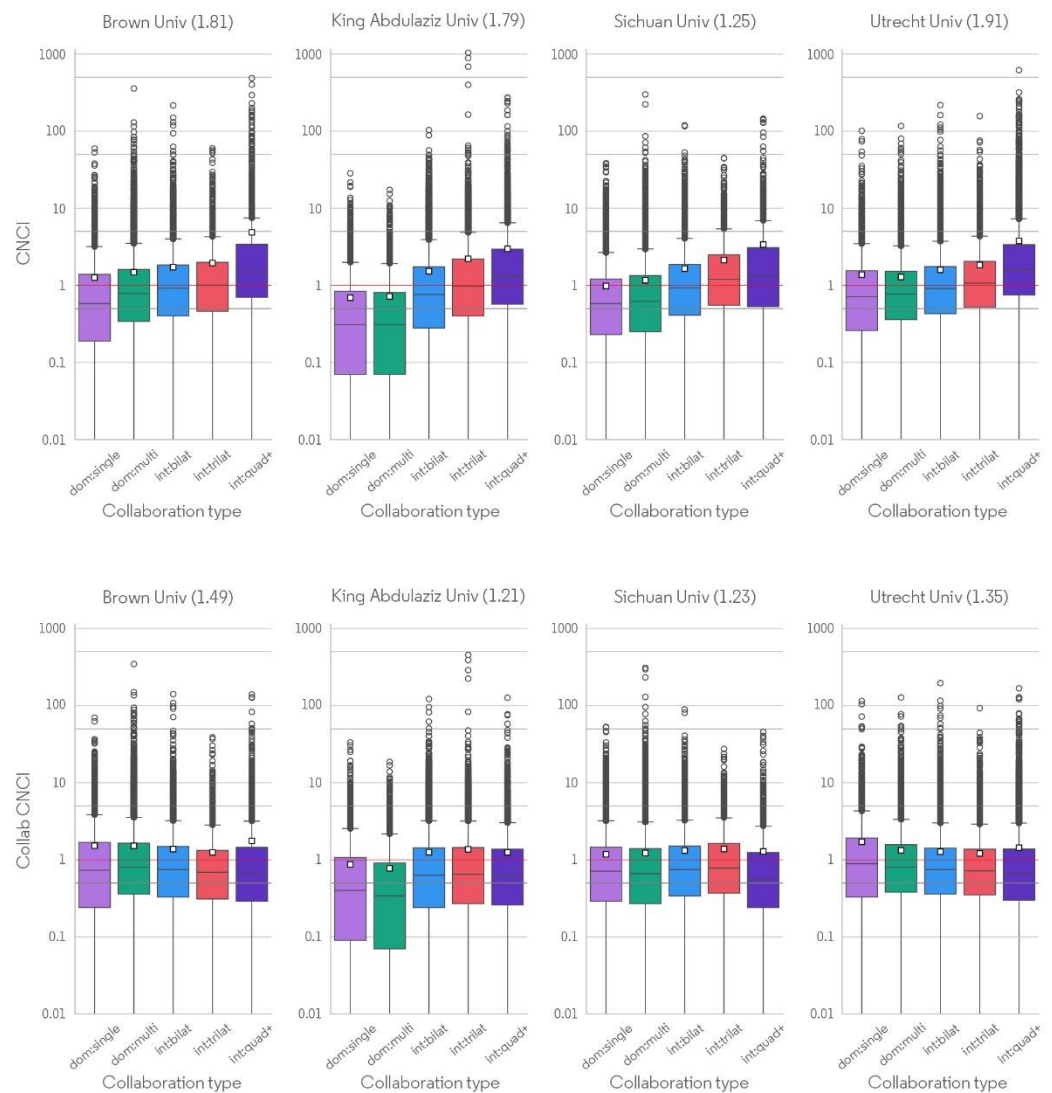
This confirms the skewing influence of extremely highly cited, multilateral papers in citation analysis and shows how a single research paper within any collaboration type can have a CNCI hundreds or even thousands of times above world average.

For institutional Collab-CNCI, however, the progression in mean values seen at the national level is absent: mean values remain seemingly stable or even decline as collaboration intensifies. However, as with nations, institutions experience increases in Collab-CNCI indicator values for domestic research but decreases for international research, compared to their standard CNCI. (Figure 5). For example, quadrilateral-plus research is no longer the best performing category in terms of mean value for most institutions, except Brown University under Collab-CNCI. This reveals where institutions' domestic research is relatively strong relative to other domestic research,

while their international research may be relatively weaker, by international standards.

Important management indicators emerge through this analysis. For example, Utrecht University's domestic single research stands out as its best performing collaboration type under Collab-CNCI, with a mean value of 1.71. By contrast, this collaboration type ranked as the fourth-best performer under standard CNCI. Thus, without this analysis, the university may not recognize and overlook the relative strength of its domestic research compared to peer universities.⁷

Figure 7: Standard CNCI (upper graphs) and Collab-CNCI (lower graphs) by collaboration type for four global universities using Web of Science article data from 2013 to 2022. Note the logarithmic vertical scale. World average (1.0) is marked by a dotted red line. Black dotted lines are plotted at CNCI values of 0.5, 5.0, 50 and 500 to aid interpretation. The central values are the median (represented by a horizontal black line within the 'box') and the mean values (white square). Overall institutional average CNCI values are in brackets next to the name. Collaboration types are domestic single institution (dom:single), domestic multiple institution (dom:multi), international bilateral (int:bi-lat), trilateral (int:tri) and quadrilateral plus (int:quad+).



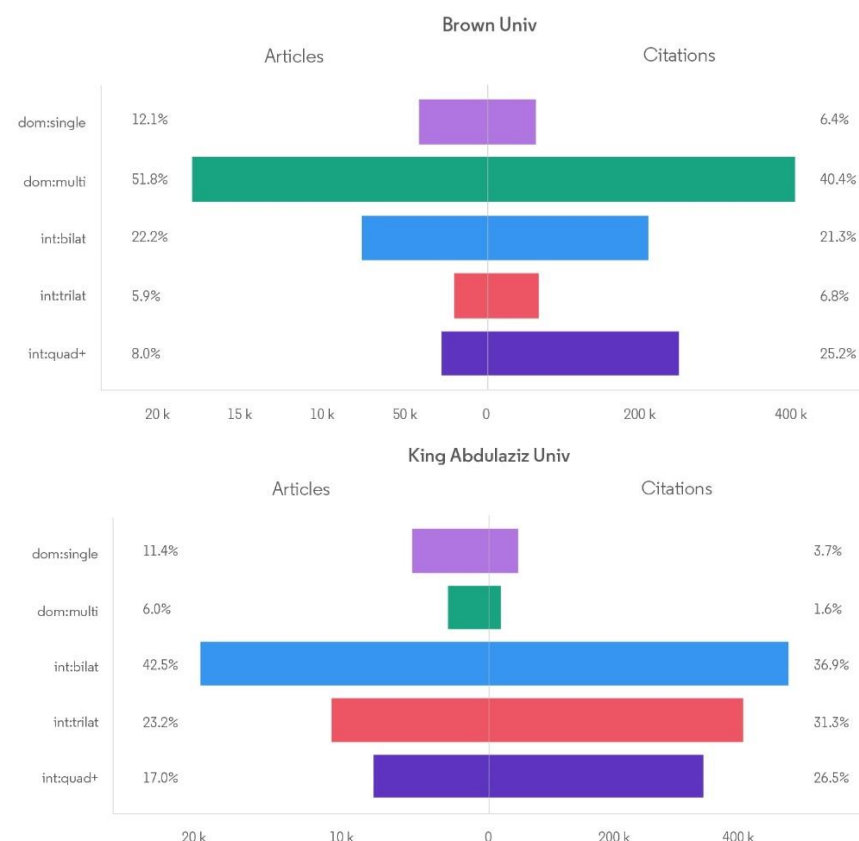
At first glance, it may appear that these four institutions have broadly similar CNCI distributions across most collaboration groups. However, when looking at the collaborative profile of their output, each is seen to have a unique distribution (Figure 6).

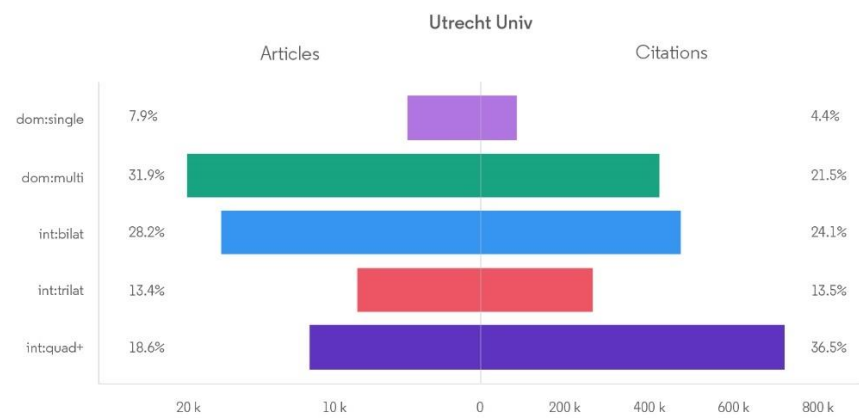
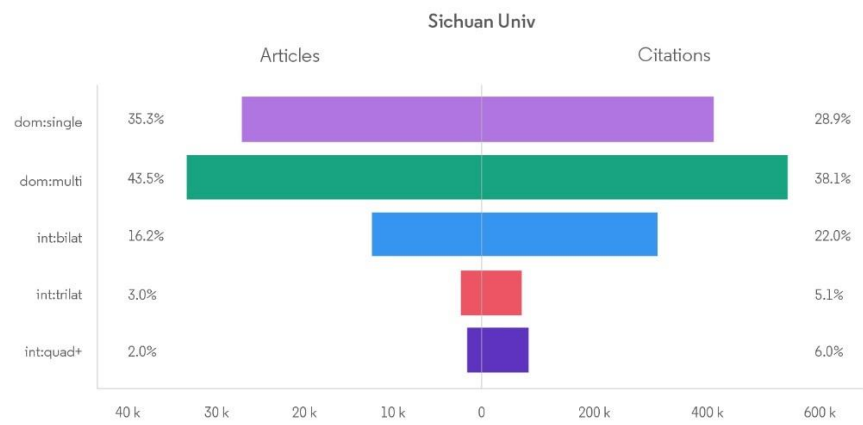
More than half of Brown University's research output comes from domestic multi-institutional collaborations, reflecting the capabilities of a large, well-funded U.S. research system, with a common language and policies. For comparison, Sichuan University's output is predominantly domestic, with nearly 80% of its research output balanced evenly between single and multi-institutional papers - a pattern consistent with the national profile of Mainland China. By contrast, King Abdulaziz University represents the opposite, with over 80% of its research stemming from international collaborations, mostly concentrated in international bilateral partnerships (42%). Utrecht University, with approximately 60% of its output coming from international collaborations, has the lowest share of domestic single-institution research (approx. 8%) but maintains a more balanced distribution across other collaboration types.

The share of citations derived from domestic research is predictably low relative to its share of output – often by two or three times lower. In contrast, international bilateral collaboration has similar shares of outputs and citations. Only trilateral and quadrilateral-plus collaboration types consistently receive a higher citation than output share, underscoring the disproportionate impact of highly multilateral papers. So, despite comprising a minor share of total output, highly collaborative papers often drive - or skew - an institution's mean CNCI value.

When coupled with deconstructed metrics by collaboration type, these visualizations provide a robust foundation for a more informed and balanced approach to research assessment and management.

Figure 8: Article and citation counts, along with their respective percentage shares, by collaboration type for four global universities using Web of Science article data. (2013- 2022).





8. Conclusion and key insights

There are many factors that influence citation patterns, beyond the traditional ones of publication year, document type, and subject category. While collaboration is a key factor, it is not the only one. Other influences include, but are not limited to, interdisciplinarity of the research topic, its relevance to emerging societal needs, and the level of funding. This report focuses specifically on collaboration, recognizing its integral role in the modern research landscape and its importance for research assessment.

The analysis highlights that the introduction of Collaboration-CNCI not only complements but also enhances the 'standard' CNCI. For stakeholders seeking to understand how collaboration shapes research outcomes, these new metrics provide essential insights. The findings suggest that the rising impact of academic research owes more to the growth of international collaboration than to domestic policies – an outcome that might remain obscured without a thorough analysis of a broad array of rich multidimensional data. There is a significant warning here: a failure to examine the broader implications of international collaboration data risks that a research assessment manager will be led down the wrong path. This can lead to misguided conclusions and ineffective policy decisions.

Furthermore, breaking down publications and their Collab-CNCI by collaboration type enables research offices, governments and funding organizations to analyze current collaboration patterns and refine their strategies.

Key questions to consider include: How effectively does an institution or country leverage domestic and international collaborations? How closely do their collaboration patterns align with global trends? How stable is their citation impact in the long term?

Regarding the latter, while international collaboration is widely recognized as a driver of higher citation impact, strong domestic collaborations remain foundational for building a sustained research environment. Large multinational collaborations, while impactful, can be difficult to establish and maintain in the long run. Therefore, bi- or trilateral collaborations often represent a more practical and reliable strategy for fostering long-term growth in citation impact.

Accurately assessing and managing research impact is essential for effective and informed decision-making and strategic investment. By adopting refined metrics that account for the complexities of research collaborations, stakeholders can ensure that research funding is utilized efficiently and that policy decisions are informed by reliable and meaningful data.

This report serves as a vital resource for researchers, policymakers, and research managers, providing actionable insights to enhance the evaluation and strategic direction of research activities. It advocates for a more informed approach to understanding the real impact of research, ultimately contributing to societal progress and the advancement of knowledge.

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