New Zealand as a science nation

Current status

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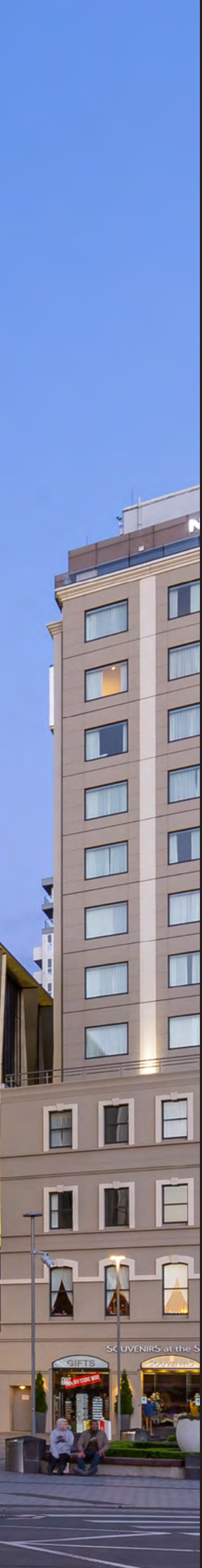


Contents

Preface

In this section, Elsevier and New Zealand's academic and policy leaders share their reflections on the findings presented in this report.

We sincerely thank all contributors for sharing their valuable perspectives.

New Zealand is in the process of a fundamental transition in its science and innovation system.

Data on its academic production provides information that can inform how that system should evolve, what are its current strengths and what is its potential. This timely report provides important insights showing how effective and efficient the science community has been, despite comparatively low funding levels. It also informs those considering the system's evolution.

Sir Peter Gluckman

Director, Koi Tū: Centre for Informed Futures

President, International Science Council, Emeritus University

Distinguished Professor, University of Auckland

A well-functioning science and innovation ecosystem plays a key role in supporting national prosperity and security.

New Zealand, whilst geographically distant from many of the large economies, is well connected in the global science system. It makes important contributions, for instance, by advancing the UN's Sustainable Development Goals, with strengths around Life under water (Goal 14) and Life on land (Goal 15).

The science system in New Zealand is undergoing a transition. Reports by groups such as the Science System Advisory Group have proposed several changes to advance the country's science and innovation system. Elsevier, as an analytics and information business, aims to support academics, policymakers and governments with evidence-based analytics. The *New Zealand as a Science Nation report* is one in a series of country reports that supports these goals. We hope this report will serve as a discussion starter to inspire further thoughts about how the science and innovation landscape can support national objectives.

Some findings to highlight are that New Zealand's researchers are notably engaged in international collaboration, resulting in strong publication as well as policy impact. The report also looks at the roles played by universities and the Crown Research Institutes, both of central importance to New Zealand's research output. There are also challenges, notably around knowledge interactions with industry, as well as relatively lower scholarly activity in key technologies, such as artificial intelligence and clean energy.

Overall, it is our hope that the report provides valuable insights into the current state of New Zealand science and highlights considerations for strategic choices in future developments

Dr. Nick Fowler
Chief Academic Officer,
Elsevier

This report represents a timely analysis of perhaps a unique scientific system.

New Zealand is a small nation on the Pacific ring of fire, geographically isolated from the rest of the world. In many ways, this physical and social geography has shaped the way New Zealand has developed and implemented its scientific research system.

The academic strength as demonstrated through the FWCI indices is remarkable and a credit to the nation, particularly in the context of geographical separation. As a country historically dependent on agricultural production, the strength demonstrated in the areas of biotechnology and biological science is understandable as it is the focus on environmental sciences.

What is less obvious in the report, but perhaps represented the strength of the policy environment, is the strength that has developed in New Zealand over the last few decades in recognising the indigenous people in New Zealand (and to a lesser degree the people in the neighbouring Pacific nations). To its credit, New Zealand has developed a very sophisticated integration of indigenous populations into its mainstream science system.

The report calls out the low cross-sectional connectivity, however this needs to be seen in the context of both the geographical isolation of New Zealand and the relatively low population base. This makes establishing connections more difficult compared to countries that sit within, or adjacent to, large population centres with associated large industrial systems.

The New Zealand system is in a period of significant change in response to a wide-ranging review of research activity. This report is particularly timely as it will provide a useful baseline measure to enable an evaluation of the effect of the changes.

Professor Emeritus, Aidan Byrne
University of Queensland,
Chair MBIE Science Board

Executive summary

New Zealand as a science nation supports global progress in science and innovation, with significant contributions in biotechnology, nanotechnology, marine science, geological research, and health. Interdisciplinary research through integration of mātauranga Māori with Western science, goes beyond existing standards to address complex social and environmental issues.

How well is New Zealand's science system performing?

Despite accounting for only 0.07% of the world's population, New Zealand contributes 0.4% of global scholarly output, reflecting a research productivity nearly six times its population share. The research has high academic impact, with a Field Weighted Citation Impact (FWCI) of 1.58, meaning that publications from New Zealand are 52% more cited on average than the world average.

What is the role of international collaboration?

Despite being geographically separated from many of its collaborative partners, 63.1% of New Zealand's scholarly output involves international collaborations. This is significantly higher than the world average of 22.3%, the EU27 at 45.2% and close to Australia at 61.2%. Further, these internationally co-authored publications have nearly twice the world average academic impact FWCI of 1.91, implying that such output is cited 91% more than the global average.

What is the role of cross-sectorial collaboration?

Cross-sectorial collaboration between academia and industry is crucial to drive innovation. However, compared to Australia and other Small Advanced Economies, New Zealand exhibits one of the lowest rates of Academic-Corporate collaboration, at only 3.6%. Collaborations are impactful, as research with Academic-Corporate partnerships shows an FWCI nearly four times higher than purely academic collaborations, highlighting their relevance.

What is the impact on policy?

New Zealand's research has a significant impact on policy, with 12.2% of scholarly articles published between 2015–2025 cited in policy documents. This figure is higher than the world average of 3.9%, indicating that New Zealand's research findings are actively informing government decision-making, particularly in sectors of Climate Change and Clinical Health.

What is the impact on sustainable development?

New Zealand's research strongly supports the United Nations' Sustainable Development Goals (SDGs), showing notable engagement in SDG areas Life Below Water (Goal 14) and Life on Land (Goal 15). Approximately 48% of New Zealand's research aligns with the UN Sustainable Development Goals (SDGs), surpassing the global and EU averages of 33%. However, in specific areas like Affordable and Clean Energy (Goal 7) and Industry, Innovation, and Infrastructure (Goal 9), the relative activity falls behind leading nations such as China, USA and Japan, as well as fellow Small Advanced Economies.

Which disciplines contribute the most to research impact?

The disciplines contributing most to New Zealand's research impact are primarily in Biomedical and Clinical Health, totalling 17.68% of total output. Other significant fields include Engineering and Health Sciences, including active engagement in subjects aligned with the Sustainable Development Goals, with output covering a majority of topics outlined in the SDGs.

What is the academic impact of the Crown Research Institutes?

Crown Research Institutes (CRIs) in New Zealand make a crucial contribution to the research and innovation system in New Zealand, show a consistent engagement in international collaboration, with the overall FWCI for CRI research averaging 1.39, indicating that their work is 39% more cited than the global benchmark. Plant and Food Research leads in impact, particularly in addressing issues including pollution and microplastics. Some of the CRIs underperform in key metrics because of multiple factors including a lack of funding and thin distribution of resources. As such, following the changes in metrics as the CRIs shift to Public Research Organizations (PROs) is of key interest.

What is the academic impact of universities in New Zealand?

The University of Auckland is the leading institution in terms of scholarly output and international collaboration, while Auckland University of Technology demonstrates the highest academic impact per publication, based on FWCI. All universities in New Zealand exhibits high rates of international collaboration, with more than half of their output derived from global partnerships.

Introduction

How well is New Zealand performing in science, and how does its research activity support national competitiveness?

This report analyses this from the lens of scholarly publications and their impact. We examine the volume and academic impact of New Zealand's research publications with comparators of similar economic size, looking further at its influence on knowledge transfer, policy, contribution to key technologies and sustainability. The aim is to provide insights that inspire further discussion, particularly considering the large-scale restructuring recommended by the Science System Advisory Group report and merging of the Crown Research Institutes in the latter half of 2025.

This report is structured as follows. **Chapter 1** assesses New Zealand's position in the global scientific landscape. **Chapter 2** examines the role of international collaboration, crucial for any country to be at the frontline of science and innovation. **Chapter 3** explores the role of cross-sectorial collaboration. **Chapter 4** investigates the impact of New Zealand's research on policy, sustainability and key technologies such as AI, Clean Energy and Biotechnology. **Chapter 5** dives into the impact of the Crown Research Institutes and universities in New Zealand. **Chapter 6** presents a summary of the findings. The report concludes with an Appendix, including a list of definitions and data sources.

The report is part of a series of research landscape analyses by Elsevier, covering topics such as Artificial Intelligence, Net Zero, Biodiversity, Gender Gap in Science, as well as country or region-focused reports. The goal of these reports is to stimulate discussions and support evidence-based policymaking.

The report is based on data and analytics from Elsevier's comprehensive tools Scopus and SciVal (See Appendix 2 for details). A majority of the analysis is based on the timeframe of 2020–2025, with the exception of figures showing trends over time, as the 2025 data only accounts for half of the year and will be finalized in the Spring of 2026. As a leading publisher, data and information analytics provider Elsevier is for more than 140 years Elsevier serves Academic and Government institutions, top research and development-intensive corporations, healthcare institutions, medical and nursing students in over 180 countries and regions to advance science and improve health outcomes, striving to create a better future worldwide. Past reports within the "Science Nation" series have included reports for Germany, the Netherlands and Sweden.

How does New Zealand's science perform compared to other countries?

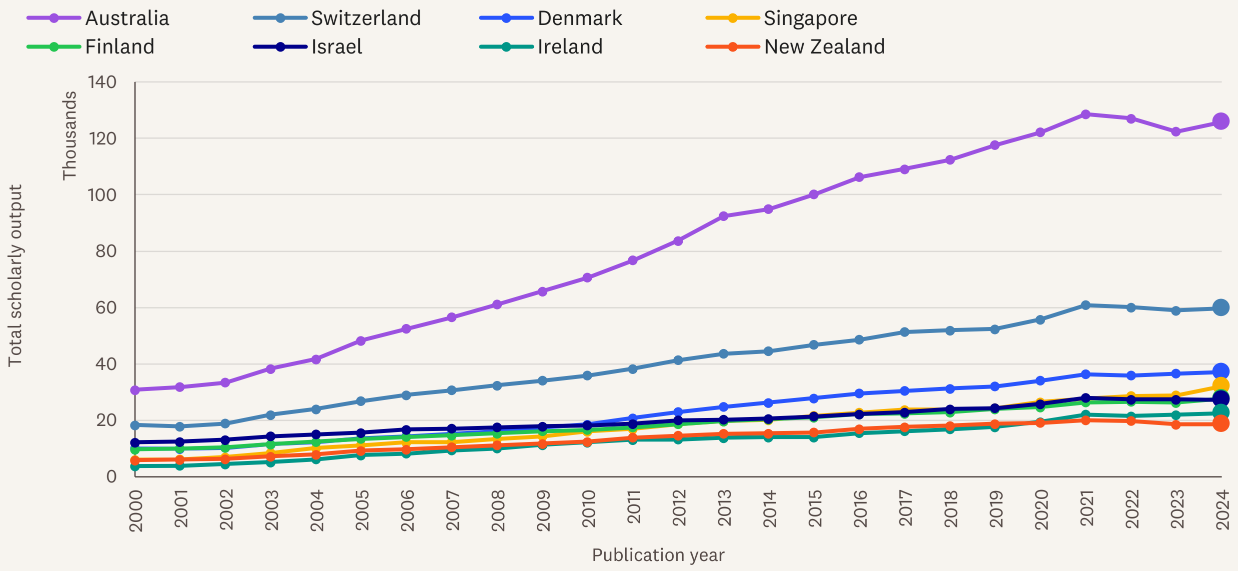
To put New Zealand's performance as a science nation into perspective, we begin by examining the publication output and citation levels of selected countries.

New Zealand invested 1.54% of GDP into R&D in 2024, with 0.97% by the business sector – below the OECD average of 2.7 % of GDP (StatsNZ, 2024; OECD, 2025). The number of scholarly publications can be utilised as a key measure of research activity to examine overall research output. Whilst New Zealand invests less in R&D in comparison to other SAEs, New Zealand maintains consistent volume in scholarly output, reflecting the efficiency of the science system. The upcoming reforms of new Zealand's science, innovation and technology system based on the Science System Advisory Group Report, as well as our analysis still shows room for improvement, notably around the translation of research towards broader impact. Figure 1 shows the scholarly output from 2000–2024 for selected countries.

As comparators, we use the neighbouring Australia and the member nations of the Small Advanced Economies Initiatives (abbreviated as SAE). The Small Advanced Economies Initiative is a collaboration between Denmark, Finland, Ireland, Israel, New Zealand, Singapore, and Switzerland. All the countries are advanced economies by International Monetary Fund standards and are of similar scale in terms of populations around 5 to 10 million. Current work by the initiative includes research on science and innovation, economics, and international representation in small nations.

Figure 1

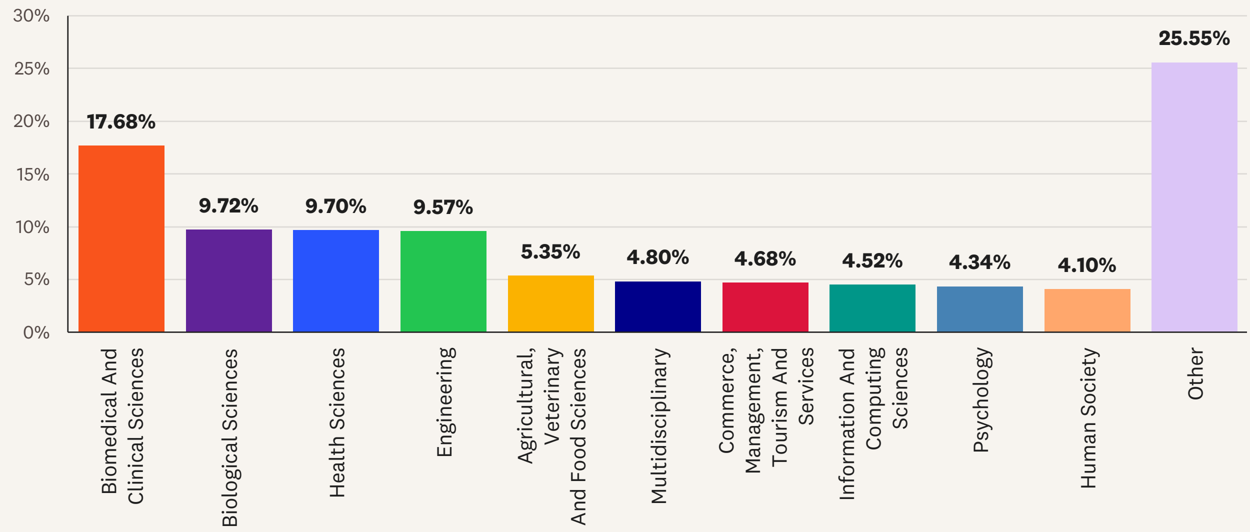
Total scholarly output per publication year for selected countries



All comparator countries have shown an increase in output over the time-period. To note, the declining trend in scholarly output for many countries following 2020 (Figure 1) is most likely a result of the pandemic affecting how researchers could work and publish.

Figure 2

Percentage of total scholarly output by New Zealand in the top 10 Fields of Research (FoR) category, the standard classification used in Australia and New Zealand



Taking a closer look at New Zealand and its scholarly output, Figure 2 highlights the distribution of output across the Fields of Research (FoR) categories (see Appendix 1 for definition). Biomedical and Clinical Sciences takes the lead, followed by Biological Sciences and Engineering. The top categories show strong engagement in STEM subjects, totalling an approximate 50% of all output. There is also strong engagement in agriculture, commerce and social sciences. Chapter 5 will further explore the contribution universities in New Zealand and the Crown Research Institutes make to each of these categories. To estimate the academic or scientific impact, we use a standard proxy of citations, here the advanced normalized indicator of Field Weighted Citation Impact (FWCI, detailed definition available in Appendix 1). This measures citations, normalized against discipline, type and year of publication. The FWCI is normalized to 1.0 for the world average, meaning an FWCI of 1.2 indicates that publications on average are cited 20% more frequently than the global average, while an FWCI of 3.0 signifies three times the average citations.

Overall, across all subjects, as seen in Figure 3, New Zealand has an average FWCI of 1.58. However, in recent years, New Zealand has seen growth in FWCI which may be attributed to the suggestions following the Government's *Te Ara Future Pathways 2022 White Paper* and the nation's robust recovery from the COVID-19 pandemic. This further may suggest that the initiatives outlined in the White Paper are effective in the support to enhance the impact of national science investments. This phenomenon underscores the future potential of New Zealand's scientific landscape, contingent upon the continuation of investments and reforms in research and development.

Figure 3

Academic research published in selected regions between 2019 and 2024 in order of total scholarly output

Country	Scholarly output	Scholarly output (growth)	OA* (all types)	Authors	Authors (growth)	FWCI
Australia	617,546	8%	51.40%	302,862	+2.9%	1.62
Switzerland	287,968	16%	68.20%	163,620	+7.8%	1.72
Denmark	175,028	0%	65.00%	86,850	+10.5%	1.76
Singapore	136,276	30%	47.70%	78,292	+6.7%	1.92
Israel	133,092	12%	49.90%	82,247	+10.4%	1.44
Finland	127,951	16%	67.10%	62,646	+3.2%	1.67
Ireland	102,719	14%	61.30%	62,486	+8.2%	1.61
New Zealand	**96,336**	**12%**	**49.2%**	**50,084**	**-0.5%**	**1.52**
World	24,275,263	17.2%	44.3%	22,806,015	+28.4%	1.00

*By Open Access here it is meant all types: Gold, Hybrid Gold; Green and Bronze. Data from Scopus.

Over the past 5 years, New Zealand's research output has decreased by approximately 14%, a greater decrease than other SAEs but is most likely attributed to the restrictions experienced across society resulting from the COVID-19 pandemic. New Zealand falls in between Australia and Israel in regard to FWCI. Nordic nations are amongst some of the highest investors in R&D, with Sweden (not part of the SAE group) and Finland consistently investing around 3% of GDP, which is likely to have impact on high FWCI rates and growth in output. New Zealand stands out as the only nation seeing a slight decrease in scholarly authors, which would be a potential metric to continue tracking as Government approach to R&D shifts significantly in 2025. The restructuring of the Crown Research Institutes, reallocation of funding and other resources could positively impact the number of authors in New Zealand.

With an increasing movement towards open access and open science globally as a mean via broader dissemination to support uptake of research, Figure 3 indicates research that is open access between 2020–2025. In New Zealand, the Ministry of Business Innovation and Employment (MBIE) introduced in 2022 an open research policy that all publications related to MBIE research funding from 2023 should be published open access. Hence, it can be expected with time that the open access published research from New Zealand will increase.

How does international collaboration contribute to overall research performance?

International collaboration in science allows researchers to work with leading or complementary research environments, including top experts and cutting-edge infrastructures. It also facilitates the tackling of global challenges that may exceed the capabilities of individual countries. New Zealand, like many small innovation nations, benefits strongly from international collaborations in extending its scientific impact.

To analyse international scientific collaboration, we focus on co-publications – research papers involving at least two countries or more, as indicated by their country affiliations – as seen in Figure 4. We use whole counting, meaning for example, if authors from New Zealand and Australia co-publish a paper, it is counted as a publication for both New Zealand and Australia.

The global average for international co-publication is 22.3%, while the EU27 average is 45.2%. New Zealand is significantly ahead of global averages at 63.1%, however, falls behind other SAEs of which, Denmark, Switzerland and Singapore have globally higher rates of collaboration, above 68%. Other global countries/regions show the following international collaboration rates: Africa 45%, India 21%, Latin America 38%, the Middle East 43%, and Russia 21%. As can be seen from Figure 4, there is a correlation between international collaboration rate and FWCI. A potential explanation is that international collaborative works may be of broader international interest and hence reach a larger number of readers, potentially the likelihood of being cited.

Figure 4

Percentage of scholarly output with international collaboration in selected countries and their respective FWCI

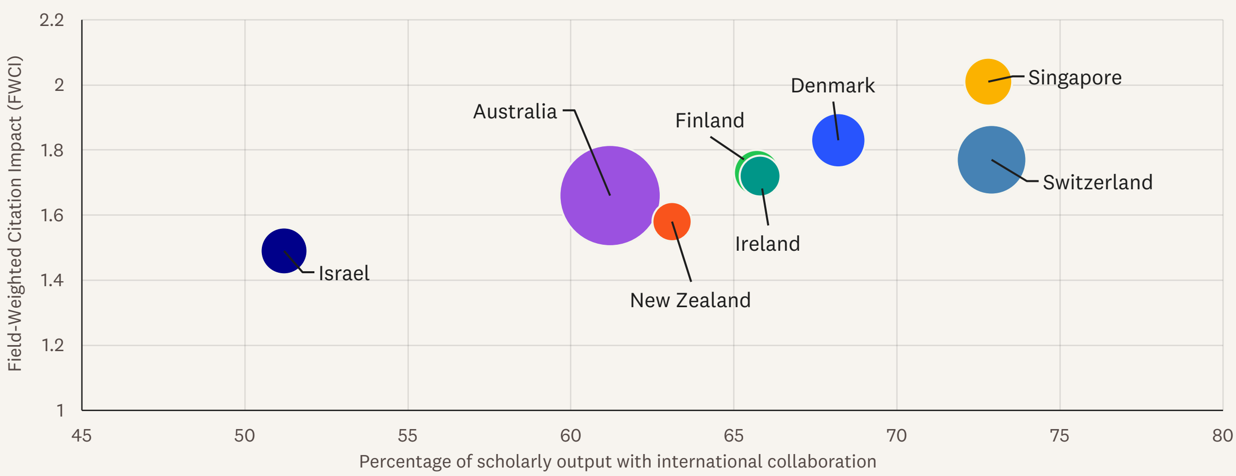
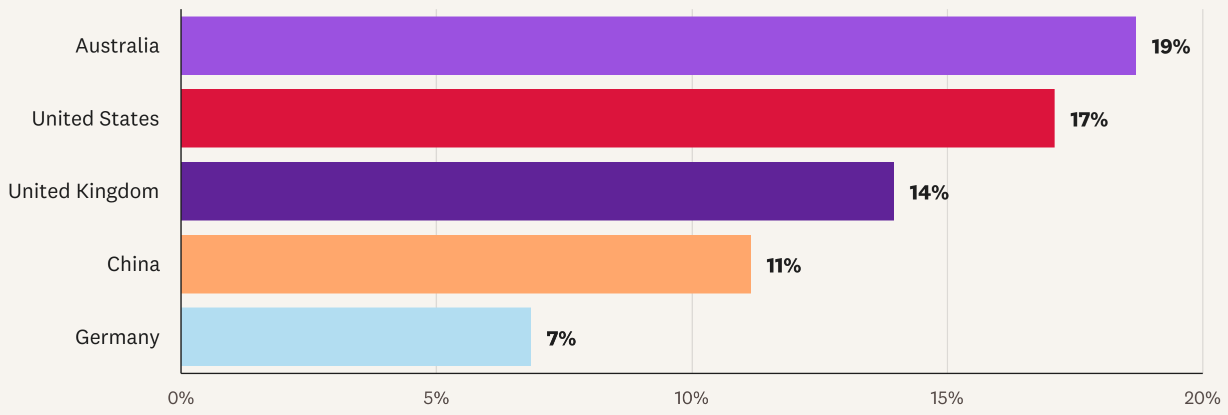


Figure 5 shows the percentage of New Zealand's scholarly output with international collaboration with selected countries. As many collaborative publications involve more than two countries (e.g. 30% of New Zealand's publications with Australia also involves the United States), whole counting is used with each country represented separately. Similarly, 40% of New Zealand's research with the United Kingdom also involves the United States. In the light of geopolitical dynamics, how the global research landscape may develop deserves special attention.

Figure 5

Percentage of scholarly output with international collaboration in selected countries



Given the high levels of international scientific collaboration for New Zealand, the question arises: how does international collaboration for New Zealand impact its overall performance?

Figure 6 compares citation levels for New Zealand research based on the type of collaboration: international, only national collaboration, only institutional collaboration and single authorship. As often is the case for many nations, the data shows that international collaborations see a higher citation impact compared to collaborations within the national borders. It must be noted that the importance of national collaboration is not dismissed, as the topics explored in such research often relates to local issues, regarding law, education, history, culture, as well may be of relevance for local industry collaborations, for example.

To understand further the role of international collaboration, it is of relevance to look at the degree of international co-authorship for different disciplines.

Figure 6

The research impact of New Zealand's scholarly output measured as FWCI for types of collaborations

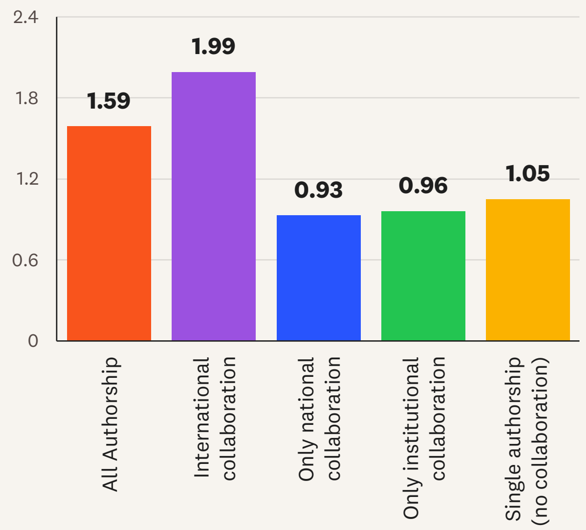
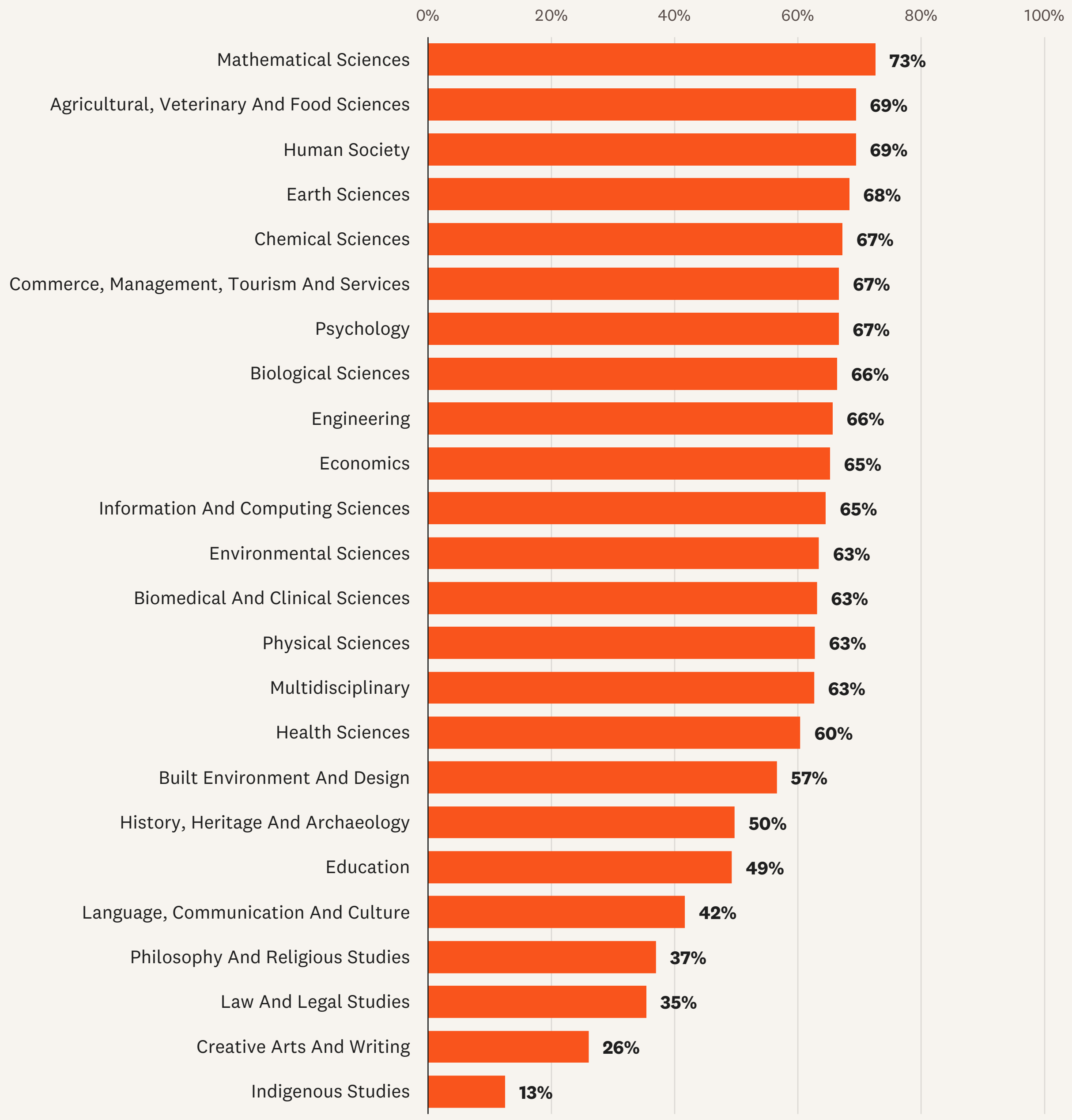


Figure 7 illustrates the degree of internationalization in research across different Field of Research subject areas in New Zealand. Mathematical Sciences show the highest rates of international collaboration, followed by Animal, Veterinary and Food Sciences and Human Society. In contrast, Philosophy and Religious Studies, Creative Arts and Writing and Indigenous Studies have the lowest shares of international collaboration, although unsurprising as social science and humanities disciplines often focus on national — not necessarily global — topics. However, this does not imply that these topics are less relevant.

Figure 7

Share of international collaboration per subject area according to Field of Research (FoR) expressed as a percentage



The role of cross-sectorial collaboration

A key driver of innovation lies between the knowledge exchange between academia and industry. Among comparators, New Zealand sees the lowest rate of Academic-Corporate co-publication, however, scholarship that does have cross-sectorial collaboration has above average academic impact.

Academia-corporate collaborations take many forms, from exchanges in ideas and people, contract research, licensing, co-publications and patents. Academic-Corporate co-publications and citations in patents can be used as proxies of academia-industry collaboration. It is important to recognize that these are only partial indicators of broader academia-industry collaborations, as much of knowledge exchange between academia and industry does not result in published research.

From data covering the ten-year period between 2015–2025, among comparators, New Zealand sees the lowest engagement between academic and corporate research, just after Australia. Singapore leads in patent citations to scholarly publications with 7.5%, whilst Denmark shows the highest percentage of co-publications with 9.6%, although all are above the world average of 2.7%.

However, data on Academic-Corporate collaboration must be interpreted along with an understanding of each nation's industry distribution. Pharmaceuticals and Biotechnology, Information Technology and Software as well as Agriculture and the Food Industry are typical contributors to Academic-Corporate collaboration. These industries, aside from Agriculture, are less dominant in New Zealand, making the low rate of Academic-Corporate collaboration within expectation

Figure 8

Percentage and volume of Academic-Corporate co-publications which are cited by patents in select nations (2015–2025)

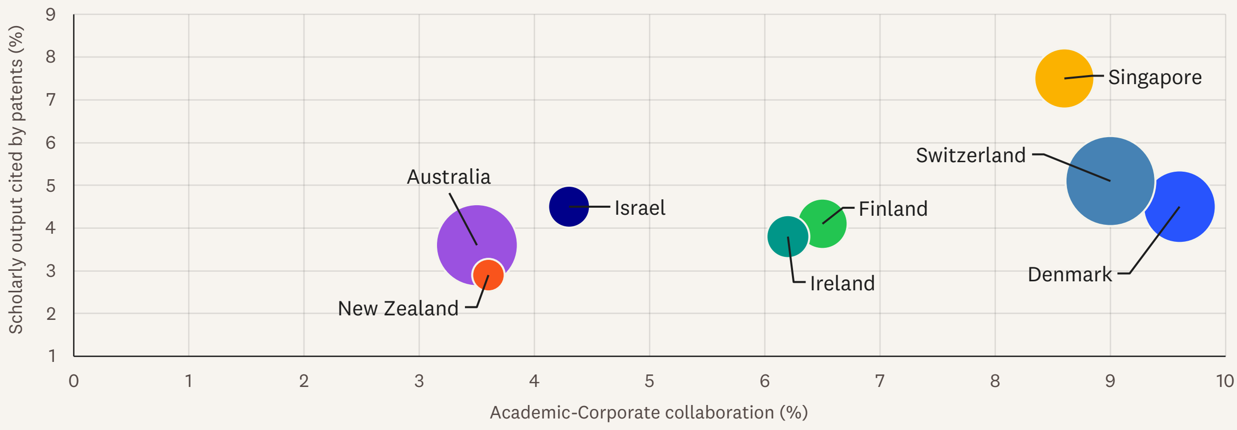
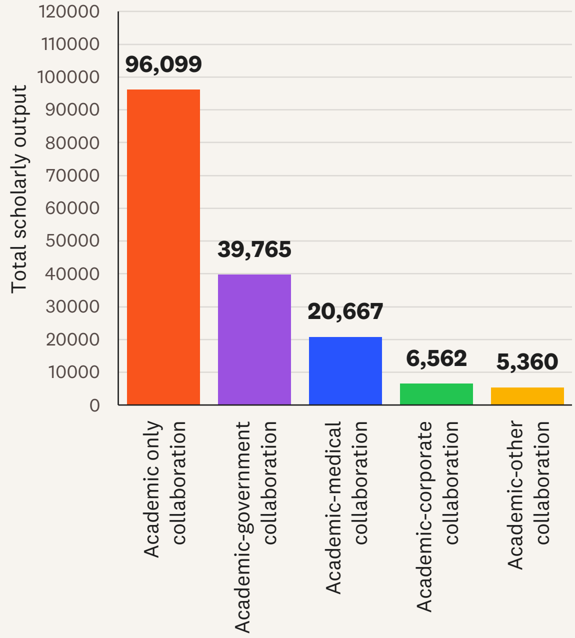


Figure 9 illustrates the landscape mix of cross-sector collaboration, showcasing the involvement of local and global partners. Whilst not visualised, there are insightful observations that can be made from the data. Key institutes in Academic-Corporate collaborations include France's CNRS, and the French Institut national de la santé et de la recherche médicale and the Auckland District Health Board. The higher rate of academic-government collaboration highlights the engagement between Crown Research Institutes – CRIs and universities, particularly with NIWA, AgResearch, and Plant and Food Research New Zealand collaborating with the University of Auckland, Massey University, and the University of Otago. Although Lincoln University has the lowest output (2,647 publications from 2020–2025), its 4.3% rate of cross-sector publications results in significant impact, with 15% cited in patents. In contrast, New Zealand universities average 3.1% for Academic-Corporate collaboration and 11.8% cited in patents. The *Science System Advisory Group Report 2024* recommends investing in New Zealand-based economies to boost innovation, make changes in scholarly output and collaboration a valuable measure of investment impact.

Figure 9

Total scholarly output for selected types of academic collaboration (2015–2025)



Impact of science on policy, sustainability and key technologies

Beyond its academic significance, New Zealand's research is making a tangible difference by influencing policy and contributing to real-world progress on global sustainability challenges and key technologies.

To examine the impact of New Zealand's research on government policy worldwide, similar to patent citations to scholarly output, we can as a useful proxy analyse the percentage of scholarly output that is cited in policy documents.

The results reveal that 12.2% of New Zealand's articles published between 2020–2025 have been cited in policy documents, significantly ahead of the 2.9% World average, on par with its comparator nations and just ahead of its neighbour Australia. This shows the positive impact from New Zealand in this respect.

Lincoln University and the University of Otago stands out within New Zealand's institutions, with 15% and 14% of its research cited in policy documents respectively. Based on this information, further analysis could explore which policy documents are cited in New Zealand's research and in what contexts.

A significant contributor to New Zealand's overall impact in policy citations are the Crown Research Institutes. Figure 12 shows that NIWA and ESR show strong impact, particularly considering that the world average is 3.9%. NIWA shows significant contributions to issues on Climate Change and tackling carbon emissions, highlighting the presence of the CRIs on a global scale. The renewed interest in focusing greater on New Zealand's investment in R&D and innovation can further bring out the potential of the CRIs, nationally and globally.

Crown Research Institutes such as NIWA and ESR show a percentage of scholarly output cited by policy well above the global average.

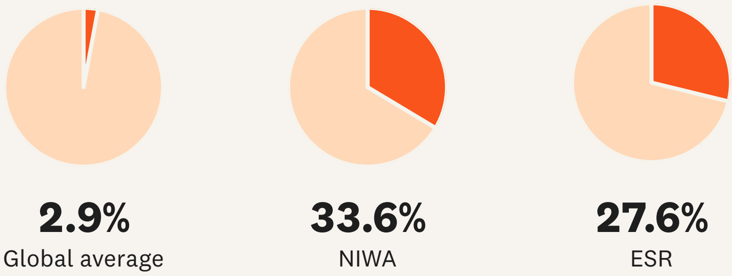


Figure 10

Scientific articles cited in policy documents (as a percentage of all articles from the country).
Publications 2015–2025

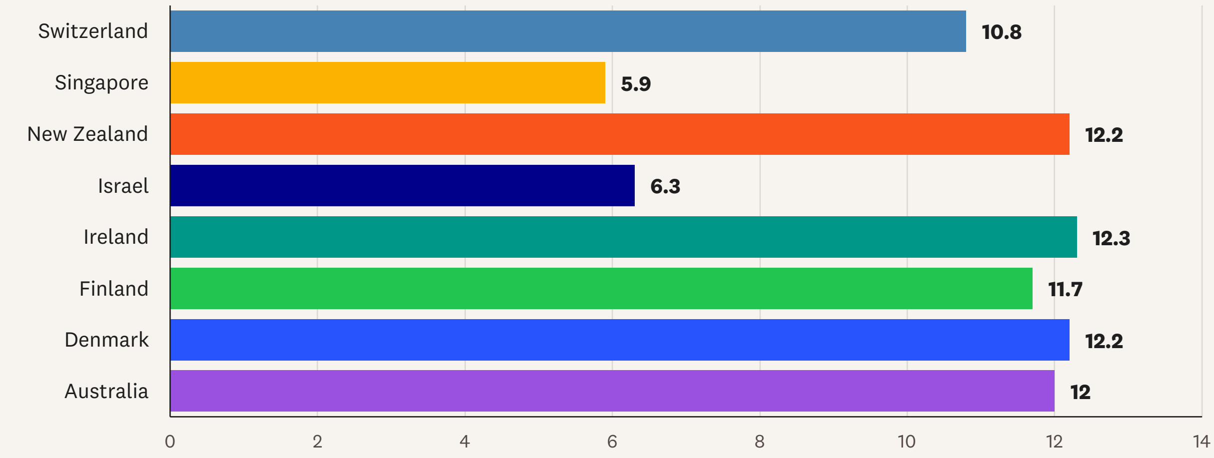


Figure 11

Scientific articles cited in policy documents (as a percentage of all articles from the institution).
Publications 2015–2025

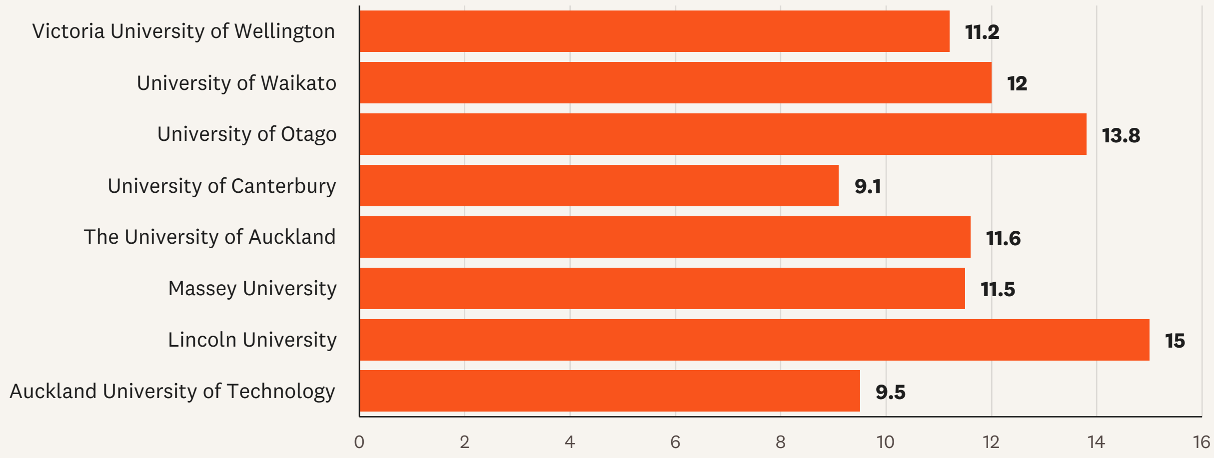
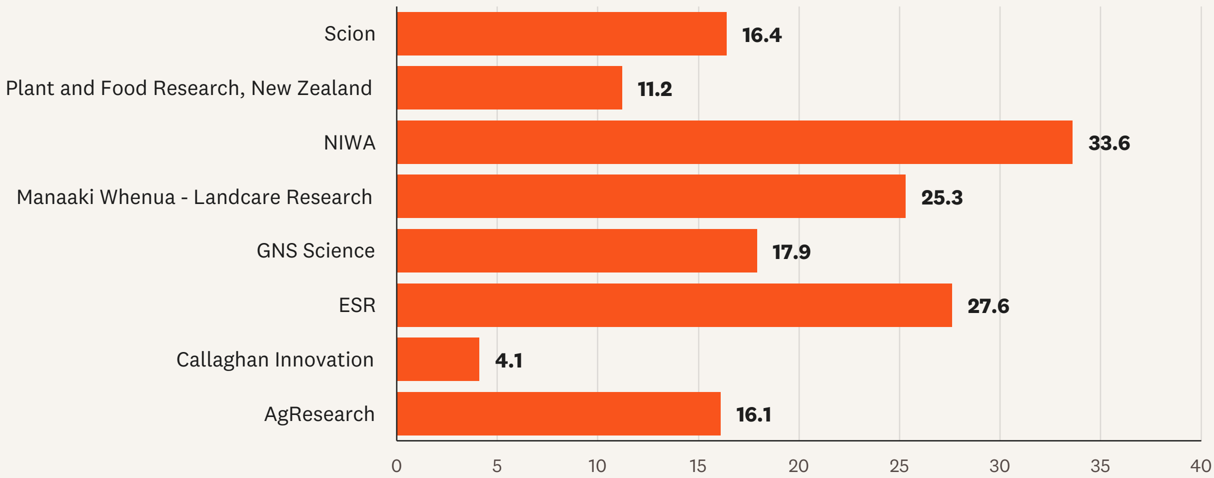


Figure 12

Percentage of scholarly output cited by policy for each CRI (2015–2025)



Sustainability

The Sustainable Development Goals (SDGs) adopted by all United Nations member states in 2015 represent a collective effort to achieve a better and more sustainable future for all by addressing critical issues facing our planet and its people. To understand how research contributes to the SDGs, Elsevier has developed a methodology, currently used among others by the Times Higher Education Impact ranking, to map publications to relevant SDGs (one or more for each publication), covering 16 of the 17 SDGs.

Figure 12 maps New Zealand's scholarly output and how it contributes to different SDGs. Here, the data is presented normalized against the global average of 1.00, to compare against Australia and the EU27. RAI, or Relative Activity Index, refers to the share of an entity's publications in a subject relative to the global share of publications in the same subject – with a value of 1.0 indicating the world average.

Figure 13

RAI (Relative Activity Index)

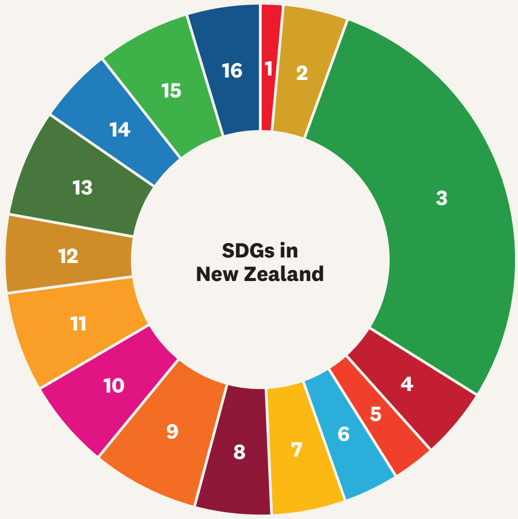
The orange line shows the relative activity (RAI) New Zealand's research relating to the 16 SDGs, compared to the World (Normalized to 1.0), the EU27 and Australia.

As seen from Figure 12, New Zealand demonstrates higher relative activity, implying a focus of research, in thirteen out of the sixteen SDGs, compared to the world Australia and EU27 average, particularly in Life Below Water (14) and Life on Land (15). However, New Zealand (along with the EU) lags behind global levels in Affordable and Clean Energy (7) and Industry, Innovation and Infrastructure (9), which may reflect the nations industry at present. To note, notably on SDG 7, globally China leads in overall research output. Overall, New Zealand's research strongly contributes to the issues of sustainability we face today.

A majority, 56%, of New Zealand's research is related to at least one of the UN Sustainable Development Goals, a higher share than both the global and EU (33%) statistics – with Figure 13 visualizing the distribution of output across the SDG topics. New Zealand has concrete impact through high FWCI levels in three key areas. Responsible Consumption and Production (12, FWCI 2.21) shows research on implementations of sustainability practices; Good Health and Wellbeing (3, FWCI 2.18) reflects New Zealand's impact in internationally co-authored output tackling global health, and Zero Hunger (2, FWCI 1.99) reflects the focus on risks and advances within agriculture and food production.

Figure 14

Relative size of each SDG in New Zealand



Key strategic technologies

Globally, many countries – including New Zealand – have identified several technologies of national strategic importance to boost competitiveness and to secure competence within the nation. This section examines three key technologies highlighted in the Science System Advisory Group Report among strategic areas: Artificial Intelligence, Biotechnology, and Clean Energy.

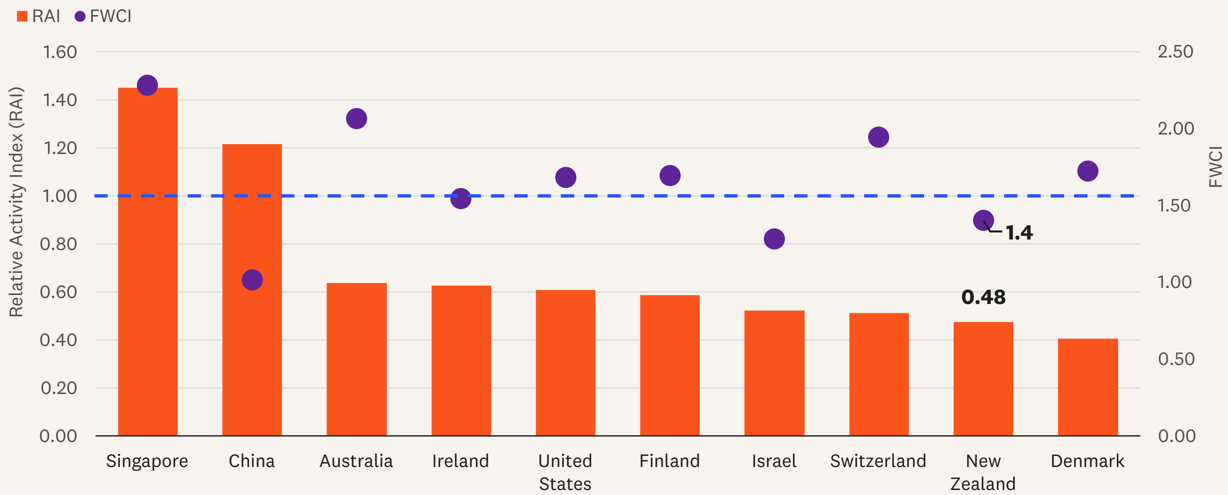
Artificial Intelligence publications

New Zealand's research on Artificial Intelligence (AI) in terms of relative activity remains on par with comparators but shows modest impact. While the United States has historically led AI research and remains a market leader with numerous applications from companies like OpenAI, Meta, and Google, China has surpassed USA in research volume for over a decade and increasingly drive innovation e.g., with companies like DeepSeek, Alibaba and Tencent.

India has also emerged as a major player, now ranking third globally in research output after China and the USA. Asia and the US dominates AI research globally, while Europe lags — a pattern also seen amongst SAE nations, with Singapore showing a strong engagement both in terms of RAI and FWCI, notably having a national strategy with AI Singapore.

Figure 14

New Zealand and comparators Artificial Intelligence research volume and activity
Publications 2020–2025

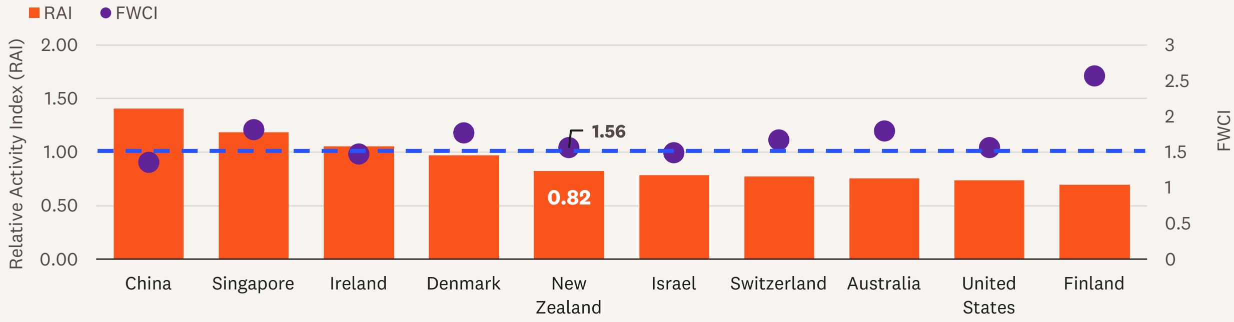


Biotechnology publications

Biotechnology is a global priority in technological research. All Scopus Journal Category (ASJC) is used for simplicity, as it categorizes Biotechnology as a sub-subject area of Biochemistry, Genetic and Molecular Biology, whereas the FoR further categorizes publications into narrower areas. This field is marked by rapid advancements and innovation, making significant contributions to medicine, sustainability, and food security. For New Zealand, with agriculture as the largest sector of the tradeable economy, biotechnology is key importance. New Zealand ranks 47th globally but has a higher relative activity (RAI) compared to its SAE partners. China leads in scholarly output, followed by the EU and the USA. Although New Zealand is engaged in biotechnology, its FWCI remains modest, likely to improve with renewed investment interest. While Finland and New Zealand have similar rates of international collaboration, Finland's high FWCI is influenced by a computer-science paper introducing SciPy 1.0 and Python, which accounts for 22,000 of its 50,000 citations.

Figure 15

New Zealand and comparators Biotechnology research volume and activity
Publications 2020–2025

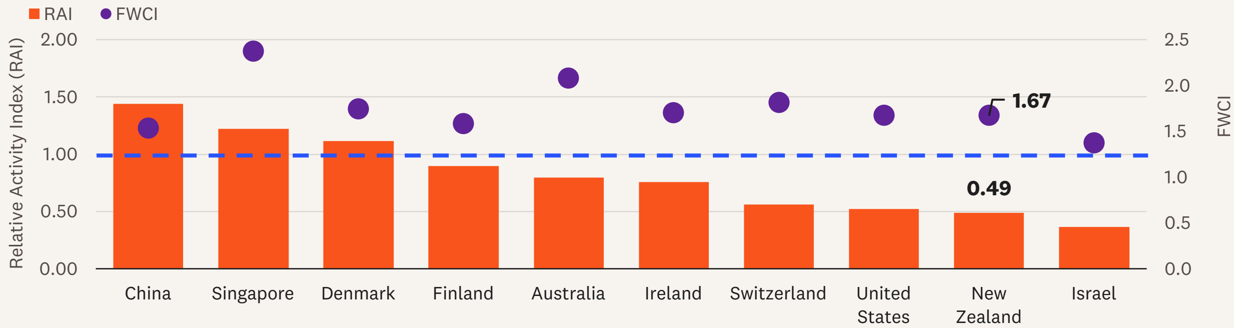


Clean energy publications

In examining SDG 7 (Affordable and Clean Energy), a distinct global trend emerges. Whilst not shown in this report, China dominates research output in this area with high relative activity, followed by the EU27 and the USA. Within Europe, Germany and the UK produce the largest number of publications. Amongst geographically closer nations, Singapore shows increasing impact – well ahead of its European partners. New Zealand again falls amongst the global average for RAI and FWCI in Clean Energy, seeing rather a focus greater on SDGs 14 (Life Below Water) and 15 (Life on Land).

Figure 16

New Zealand and comparators Clean Energy (SDG 7) research volume and activity
Publications 2020–2025



The role of Crown Research Institutes and universities to New Zealand's success

The Crown Research Institutes (CRIs), formed in 1992 as government-owned science research businesses to conduct research for the benefit of the country and contributes approximately 11% to total scholarly output. The upcoming restructuring into Public Research Organisations (PROs) is of top relevance in understanding New Zealand as a science nation. The university sector contribution to 92% of New Zealand's total scholarly output will also be discussed. To note, naturally, is that there is an overlap in terms of co-publications between CRIs and universities.

Crown Research Institutes

New Zealand's seven current CRIs will be merged to form three Public Research Organisations (PRO), with a fourth focusing on advanced technology to also be established. The new PROs are to have an increased focus on economic outcomes while delivering the critical stewardship and public good science and science services needed for a well-functioning modern economy (MBIE, 2025). Figure 17 initiates this view, by outlining the current research volume, academic impact and levels of international collaboration by the CRIs.

The overall research impact, measured as Field-Weighted Citation Impact (FWCI) for New Zealand's research published in the five-year period 2020–2025, stands at 1.39 on average, meaning research by Crown Research Institutes received 39% more citations than the global benchmark. All institutes show a high rate of international collaboration as seen in Figure 17, collaborating most with Australia, the United States, United Kingdom, China and Germany. Plant and Food Research shows the largest research impact in terms of FWCI, with articles involving International Collaboration leading in risks of pollution such as the impact of microplastics, strongly tackling global issues.

As previously mentioned in Chapter 4, the CRIs also contribute strongly to New Zealand's overall scholarly impact and percentage of output cited in policy. Yet, the full scholarly potential of the CRIs has been limited due to "poor financial performance and an over-reliance on Crown funding" according to by Science, Innovation and Technology Minister Judith Collins (RNZ News, 2025). By merging the institutes into PROs, for example NIWA and GNS Science merging with the focus on Earth Science, is likely to have fewer financial issues, if synergies can be used, would have capability to produce higher quality output and achieve even higher than NIWA's current policy citation rate of 33.6% (as seen in Figure 12, Chapter 4). Figure 17 shows the already high rates of international collaboration by the existing CRIs. Following future changes, collaboration maybe encouraged between these national and global institutions. This may be an opportunity to reflect further on the ambitions outlined in the Science System Advisory Group report to strongly engage New Zealand's businesses within the research landscape.

Figure 17

Total scholarly output of each CRI in terms of volume, charted against FWCI and % of output with international collaboration (2020–2025)

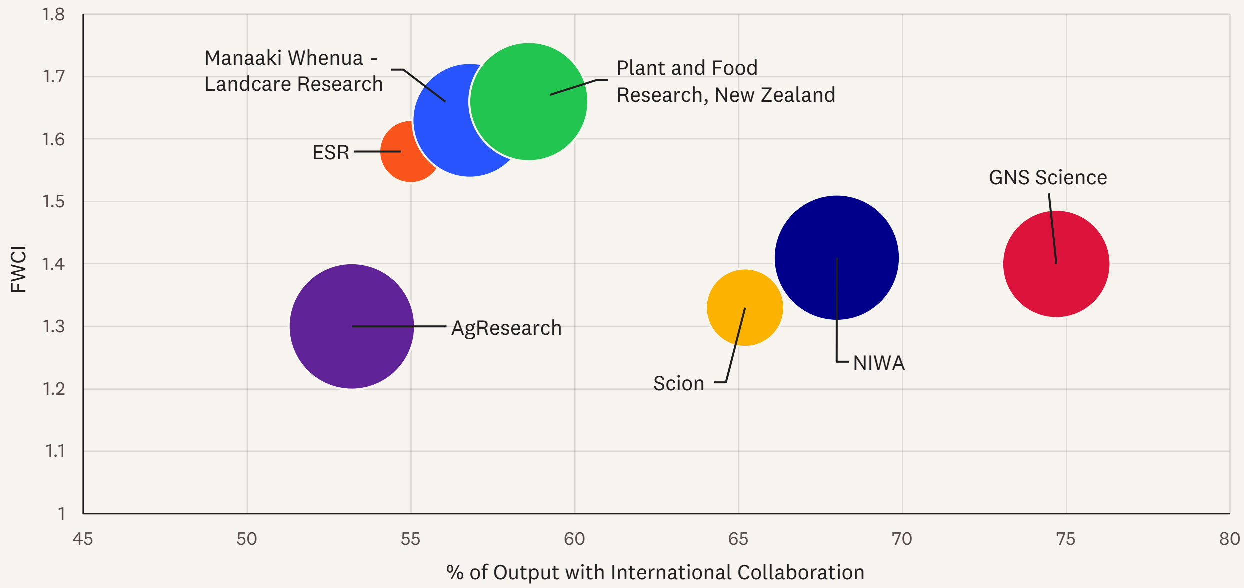
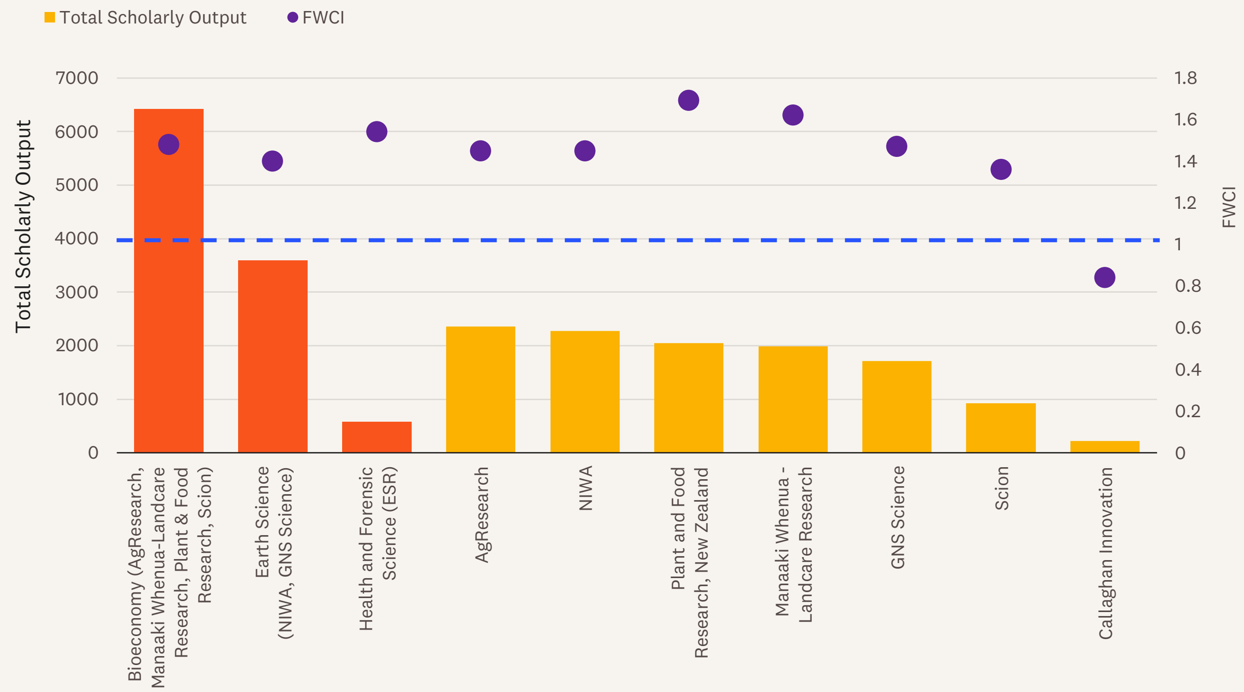


Figure 18

The total scholarly output mapped along FWCI of New Zealand's current CRIs (yellow) and future PROs (orange)



The dotted blue line denotes the world average FWCI (1.0). The output of the future PROs is calculated as a total sum of current CRIs to be merged.

Figure 18 demonstrates the potential change in impact post-mergers into the three PROs. It must be noted that the chart represents the current output of the CRIs as a total sum after merging to the PROs and should be interpreted as a starting point in understanding potential impacts of the systematic change. It is evident that the current structure results with each entity having a relatively low scholarly output. The potential post-merger PROs, as the orange bars in Figure 18, naturally, show results in a larger output for each new entity.

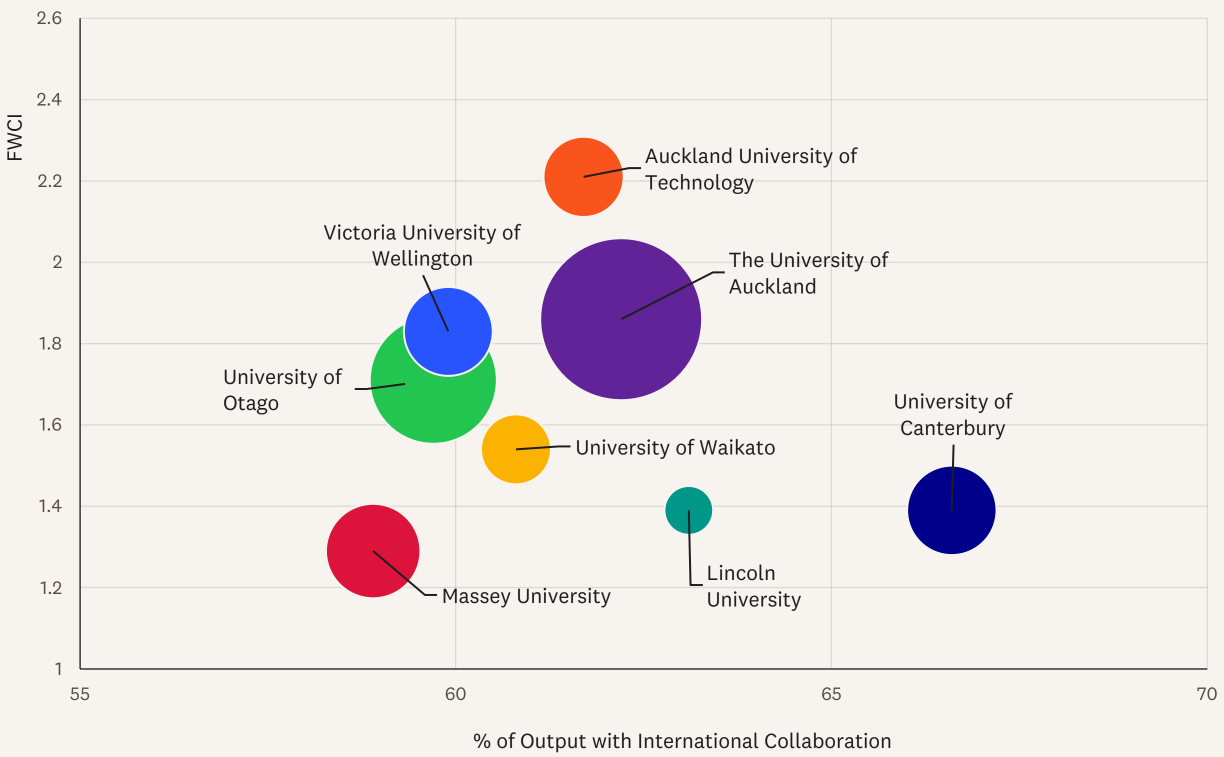
For example, AgResearch, Manaaki Whenua-Landcare Research, Plant and Food Research and Scion who all have strong FWCI individually, may be able to combine resources and increase scholarly output to a similar level as the Auckland University of Technology (8601) as the new Bioeconomy PRO. Whilst quantity does not show the full picture, it may be expected that consolidating and greater output could result in more outreach for the Bioeconomy PRO, facilitating potential collaboration opportunities and impact of research overall.

In similar nature, mergers and restructures for Earth Science and Health and Forensic Sciences may also facilitate synergies in collaboration, such as in research and management processes.

This analysis was conducted before the recent announcement confirming the creation of a fourth PRO — the Advanced Technology Institute, to be partially funded by redirecting finances from the Callaghan Innovation. Analysis seen in Figure 18 may be used as a guideline for potential methods of predicting the impact of the Advanced Technology Institute in the future. Whilst this section focuses on the reforms involving the current CRIs, it must be noted that the mergers towards the PROs are part of a large-scale plan for science reforms within New Zealand announced in January of 2025. This includes reforms to engage foreign direct investment facilitate trade growth and development of intellectual property policy within science, innovation and technology-funded research.

Figure 19

New Zealand's universities, output and the percentage of international collaboration



The size of the bubble represents volume of research at the universities.

New Zealand's universities

By examining the scholarly output and citation levels of different Universities within New Zealand's research, allows a first glance of each Institution's strengths. Overall, from the university sector, whilst not shown in a figure, Biomedical and Clinical Health leads based on output, followed by Engineering, Health Sciences and Biological Sciences.

Among New Zealand's universities, the University of Auckland leads in volume of scholarly output with international collaboration – however all universities show extremely high rates of international collaboration, with all having over half of their output include international collaboration.

Despite similar rates of international collaboration, the difference in FWCI highlights the subject focus of each university. Figure 19 shows Auckland University of Technology with the highest FWCI, resulting from greater involvement in papers with high authorship on Global Disease Burdens and COVID-19, which have broader visibility and typically attract more citations, inflating the FWCI on average. As such, The University of Auckland follows in terms of impact and leads in scholarly output as well.

Figure 20 summarises the key metrics of New Zealand's Universities, in order of total scholarly output. All the Universities are publishing close to or half of its total output as open access. Further, although most universities have seen a decrease in scholarly output and fluctuating numbers of Authors, it is likely heavily impacted by the COVID-19 pandemic, which should be taken into account when observing future output. For universities such as Lincoln University, which has explored in Chapter 3 sees a high rate of cross-sector collaboration, may see a change in the growth of scholarly output with the new Science and Innovation system potentially further enabling cross-sector work.

Amongst this output, the subject distribution sees the largest share within for subjects in Biomedical and Clinical Sciences, followed by Engineering and Health Sciences. There is a balance in distribution across subjects, but a focus on STEM – demonstrating New Zealand's versatility and strength as a science nation. A significant proportion of New Zealand's impact within biomedical and clinical sciences comes from participation in global health and disease studies.

However, New Zealand has a unique contribution within biomedical and health sciences, with many medical schools adapting to meet increasing healthcare demands and focus on indigenous health. Amongst the competitive STEM landscape, taking advantage of New Zealand's large and influential indigenous population could aid in differentiating New Zealand's science from other nations. With research on Indigenous health and equity leading amongst topics explored through university research, New Zealand has the opportunity to continue setting a unique example for other nations with diverse ethnic populations.

Further, as explored in Chapter 4 through the key technologies, areas such as artificial intelligence, biotechnology and other sub-categories within engineering have a strong presence within New Zealand's science. However, the field notes a shortage of graduates within such growing fields, which may inhibit the New Zealand's potential within such subject areas.

> *"Universities are committed to a future-focused, relevant and impactful role as part of a recharged and reformed research and science ecosystem. International collaborations are essential to maximise this, creating strength and the potential to deliver world-leading outcomes with reach well beyond New Zealand."*
>
> **Dawn Freshwater**
> Vice Chancellor of the University of Auckland (January, 2025)

Figure 20

Academic research published in selected universities between 2020 and 2025 in order of total scholarly output

University	Scholarly output	Scholarly output (growth)	OA* (all types)	Authors	Authors (growth)	FWCI
The University of Auckland	29,195	-12.2	50.40%	11,442	2	1.86
University of Otago	17,988	-16.6	54.80%	7,854	-10.8	1.71
Massey University	9,934	-15.4	52.40%	3,895	-11.9	1.29
University of Canterbury	8,906	4.1	51.30%	3,298	3.7	1.39
Victoria University of Wellington	8,792	-12.60%	51.90%	3,322	-8.7	1.83
Auckland University of Technology	7,161	-11.4	49%	2,663	4.8	2.21
University of Waikato	5,450	3.7	50%	1,843	9.4	1.54
Lincoln University	2,647	-11.6	52.20%	1,069	-19.90%	1.39
World	**24,275,263**	**17.2%**	**44.3%**	**22,806,015**	**+28.4%**	**1.00**

* By Open Access here it is meant all types: Gold, Hybrid Gold; Green and Bronze. Data from Scopus.

> *"The reform will maximise the value of the $1.2 billion of taxpayer money that we already put into the science sector each year, creating a much more dynamic science innovation and tech system."*
>
> **Science, Innovation and Technology Minister Judith Collins**
> (RNZ News, 2025)

Conclusions

Despite its small population of approximately 5.2 million (ranking 126th globally) and its geographical distance from large research nations, as detailed in the report New Zealand achieves global influence in science.

Over the past two decades, the global research landscape has transformed significantly, particularly with China's share of global scholarly output rising from 4% to 26% in 2023, while developing nations like India have surpassed the UK in output. Concurrently, the US and Europe have seen declines in dominance, with the US dropping from 28% to 18% and the EU27 from 26% to 23%, prompting nations, including New Zealand, to adapt to this new landscape.

New Zealand's research output has grown less than the global average, yet it remains impactful, evidenced by a Field-Weighted Citation Impact (FWCI) of 1.58, high international collaboration rates and a focus on sustainability, with over half of scholarly output aligning with UN Sustainable Development Goals. The Ministry of Health's investment in research post-COVID-19 is reflected in the rising FWCI in recent years, underscoring New Zealand's role as a science nation.

New Zealand's research also significantly influences policy, with 12.2% of articles from 2015–2025 cited in policy documents, demonstrating its relevance in decision-making. Research involving Academic-Corporate collaboration yields citation rates nearly four times higher than purely academic work, although co-authored research with local industry remains low. In key technologies like Artificial Intelligence (AI), Biotechnology, and Clean Energy, New Zealand shows moderate engagement and impact, with opportunities for growth in Biotechnology and Clean Energy, particularly compared to leading nations like the USA and China. Strengthening investments, reforms and collaboration in these areas is essential for enhancing competitiveness and addressing global challenges.

Key takeaways

The importance of cross-sectorial collaborations for the science and innovation landscape in New Zealand

New Zealand's science and innovation landscape faces significant challenges and opportunities considering recent global shifts in research output and collaboration. While the country's research output has grown by only 12% in the past five years, less than the 14% average among Small Advanced Economies (SAEs), it maintains a respectable Field-Weighted Citation Impact (FWCI) of 1.52, indicating notable academic influence. Whilst discussed within this report through a scholarly lens, cross-sectoral collaboration serves as a relevant proxy of understanding New Zealand's scholarly reach. In this respect, the role of key strategic technologies and the involvement of local industry is of national importance, and how a strong research component can help to support domestic capacity.

Deepening international collaboration within New Zealand's research landscape

Deepening international collaboration, based off the strong global collaboration and presence New Zealand already has through its Crown Research Institutes and universities, should remain a key priority. Continuing research across borders, and potentially increasing collaboration with geographically closer nations such as Singapore, can allow New Zealand to showcase its research capabilities and grow its position as a global science nation. International partnerships nurture the academic impact and influence of New Zealand internationally and works to further support cross sectoral collaborations, as many of these are international in nature.

Implications for the Crown Research Institutes (and future Public Research Organisations)

With a major reform of the Crown Research Institutes underway, this report is limited to illustrating how the sum of the parts as PROs may come together. How synergies in the merger of the CRIs will play out in terms of research and knowledge transfer will be of interest to monitor further. The key metrics and current state presented in this report should be monitored and used as a reference point to fully understand changes in New Zealand's impact as a science nation through the PROs.

The future state — what is in store for New Zealand as a science nation?

New Zealand's future as a science nation hinges on its ability to adapt to changing global dynamics and enhance its research capabilities across key technologies such as Artificial Intelligence, Biotechnology, and Clean Energy. While the country ranks 47th globally in biotechnology and shows modest engagement in AI, its high rates of international collaboration and impactful contributions to sustainability align well with global priorities. With nearly 48% of research linked to the UN Sustainable Development Goals, New Zealand has the potential to leverage its unique indigenous population and collaborative opportunities to differentiate itself in the global scientific arena, but it must also address challenges such as workforce shortages in critical STEM fields to fully realize this potential.

Appendix 1: Definitions

This report is primarily based on analysis made with Elsevier's tool SciVal. SciVal is based on output and usage data from Scopus, a source-neutral abstract and citation database curated by independent subject matter expert (see Appendix 2). Here the terminology used within the report is defined.

Scholarly output

Scholarly output describes the products of scholarly activity, such as journal articles, books, book chapters, conference papers, and other forms of research dissemination. Throughout the report, when looking at collaborations, we use whole counting, meaning that collaborating entities on a scholarly publication all get a full count in terms of contribution.

Authors

The number of authors is a deduplicated count of authors at the institution who have contributed to the 'Scholarly output' (i.e. the number of papers published) at that institution during the time analysed.

Citation

A citation is a formal reference to earlier work made in document, frequently to other scholarly papers, but also to policy documents or patents. A citation is used to credit the originator of an idea or finding and is typically used to indicate that the earlier work supports the claims of the work citing it. The number of citations received by a paper from subsequently published papers and/or policy documents as well as patents, can be used as a proxy of the quality, importance, societal impact or economic translational value of the reported research.

FWCI (Field-Weighted Citation Impact)

Field-weighted citation impact (FWCI) is an indicator of mean citation impact and compares the actual number of citations received by a paper with the expected number of citations for papers of the same document type (article, review, or conference proceeding), publication year, and subject area. When the paper is classified in two or more subject areas, the harmonic mean of the actual and expected citation rates is used. The indicator is therefore always defined with reference to a global baseline of 1.0 and intrinsically accounts for differences in citation accrual over time, differences in citation rates for different document types (e.g., reviews typically attract more citations than research articles), as well as subject specific differences in citation frequencies overall and over time and document types. It is one of the most sophisticated indicators in the modern bibliometric toolkit.

Subject area classification

The subject area classification used in this report is based on the Field of Research (FoR) codes. The Australian and New Zealand Standard Research Classification (ANZSRC) is a set of three related classifications developed for use in the measurement and analysis of research and experimental development (R&D) statistics in Australia and New Zealand, one of the three being the Field of Research (FoR). The categories in the classification include major fields and related sub-fields of research and emerging areas of study investigated by businesses, universities, tertiary institutions, national research institutions and other organisations.
(Source: Australian Bureau of Statistics)
https://www.arc.gov.au/manage-your-grant/classification-codes-rfcd-seo-and-anzsic-codes

International collaboration

International collaboration in this report is indicated by papers with at least two different countries listed in the authorship byline.

Academic-Corporate collaboration

Academic-Corporate collaboration in this report is indicated by papers with at least one author from an academic institution and one author from a corporate institution listed in the authorship byline

Patent Citations

This is the count of scholarly output published by an entity (e.g. a university) that have been cited by Patents. In the report we use the percentage of total output of an entity which is cited in patents. The SciVal tool used in the report collects Patent data from 107 Patent Offices worldwide.

RAI (Relative Activity Index)

Relative Activity Index is defined as the share of an entity's publications in a subject relative to the global share of publications in the same subject. A value of 1.0 indicates that an entity's research activity in a field corresponds exactly with the global activity in that field; higher than 1.0 implies a greater emphasis while lower than 1.0 suggests a lesser focus.

Appendix 2: Data sources

Scopus

Scopus is a comprehensive, source-neutral abstract and citation database curated by independent subject matter experts who are recognized leaders in their fields. 91+ million items include data from 7,000+ publishers, 94,000+ affiliation profiles and 17+ million authors. Scopus puts powerful discovery and analytics tools in the hands of researchers, librarians, research managers and funders to promote ideas, people and institutions Delivering a comprehensive overview of the world's research output in the fields of science, technology, medicine, social sciences, and arts and humanities, our state-of-the-art search tools and filters help uncover relevant information, monitor research trends, track newly published research and identify subject experts. Worldwide, Scopus is used by more than 3,000 academic, government and corporate institutions and is the main data source that supports the Elsevier Research Intelligence portfolio.

SciVal

SciVal is a web-based analytics solution with unparalleled flexibility that provides access to the research performance of over 20,000 academic, industry and government research institutions and their associated researchers, output and metrics. SciVal allows users to visualize research performance, benchmark relative to peers, develop strategic partnerships, identify and analyse emerging research trends, and create uniquely tailored reports.

Overton

Overton is the world's largest searchable index of policy documents, guidelines, think-tank publications and working papers. Its database consists of more than 1.65 million policy documents, with data collected from 182 countries and over a thousand sources worldwide. These policy documents include white papers from international multilateral organizations, as well as guidelines from city councils, parliamentary transcripts and other classes of the so-called "gray literature." Around half of these documents make citations to academic or scholarly publications. More than 2 million distinct journal-based publications are cited by at least one policy document in the database.

External Sources

Argue, Mary. 2025. "Crown Research Institutes to Merge into Three Mega Science Groups." RNZ. RNZ. January 23. https://www.rnz.co.nz/news/national/539736/crown-research-institutes-to-merge-into-three-mega-science-groups

MBIE. 2025. "Research and Development Survey: 2024: Stats NZ." Research and Development Survey: 2024 | Stats NZ. Ministry of Business, Innovation & Employment. March 12. https://www.stats.govt.nz/information-releases/research-and-development-survey-2024/

OECD. 2025. "Main Science and Technology Indicators." Main Science and Technology Indicators. Organisation for Economic Co-operation and Development. March. https://www.oecd.org/en/data/datasets/main-science-and-technology-indicators.html

Percy, Chelydra. 2025. "GNS Science Responds to Government's Science System Reform Announcement: GNS Science: Te Pū Ao." GNS Science | Te Pū Ao. January 23. https://www.gns.cri.nz/news/gns-science-responds-to-governments-science-system-reform-announcement/

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