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Mapping the Canadian Research Landscape in 2023

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Abstract

This article presents an in-depth analysis of Canadian university publications in 2023, conducted through a Scopus search for "Canada." The research provides insights into prominent academic associations, with University of Toronto leading at 19,960 publications, followed by University of British Columbia (11,658) and Université McGill (9,123). Engineering and Medicine emerge as leading disciplines, with significant collaborative efforts observed in interdisciplinary research and Environmental Science. Private institutions such as Trinity Western University and University Canada West demonstrate vibrant research atmospheres, particularly in Business, Management, Accounting, and Computer Science. The investigation offers an overview of research environments, highlighting collaboration patterns and areas of specialization within both public and private academia.

Introduction

University publications serve as a critical catalyst in the progression of scholarly understanding and the promotion of intellectual dialogue both within and outside the academic sphere. The aforementioned publications, which comprise books, journals, and research papers, provide a concrete manifestation of the state-of-the-art investigations and scholarly work undertaken by university faculty and researchers. By actively participating in the distribution of novel concepts, approaches, and findings, they enhance the overall body of global knowledge. Furthermore, university publications serve as a crucial means of bolstering the standing and renown of academic establishments, as they faithfully mirror the caliber and profundity of investigations undertaken by their staff. Prominent scholarly publications elevate the reputation of universities globally and entice brightest scholars and pupils, thereby cultivating a dynamic academic milieu.

University publications hold a significance that transcends the boundaries of academia, as they make substantial contributions to both societal advancement and economic development. Publications that convey research findings frequently result in technological advancements, innovations, and solutions to tangible challenges. Universities enhance public welfare and tackle worldwide issues by disseminating their knowledge and discoveries via scholarly publications. Furthermore, university publications function as an indispensable resource for industry professionals, policymakers, and other relevant parties, exerting a significant impact on the trajectory of diverse sectors and determining the processes of decision-making. The fundamental importance of university publications resides in their capacity to stimulate the

generation, distribution, and implementation of knowledge, thereby cultivating a society that is both progressive and ever-evolving.

In addition, the visibility and influence of a university's publications are frequently used to gauge its scholarly standing. The impact and pertinence of a university's contributions to a specific domain are gauged by the frequency of citations in other scholarly publications in its research. Publications that have a significant influence not only elevate the standing of individual researchers but also the institution as a whole, are indicative of high-impact publications. Consequently, this fosters funding opportunities, collaborations, and the presence of distinguished faculty, establishing a positive feedback cycle that amplifies the influence of university publications on the academic and wider societal sphere.

Comprehending the present condition of scholarly publications in Canadian universities is critical for a multitude of reasons. Initially, it furnishes significant perspectives on the condition of scholarly investigation and the generation of knowledge within the nation. An evaluation of the specializations and strengths of Canadian universities can be achieved through an analysis of the publications' nature, quantity, and quality. It is of the utmost importance that policymakers, funding agencies, and academic institutions possess this knowledge in order to allocate resources strategically, determine research priorities, and encourage collaborations in fields where Canada has the capacity to excel internationally.

A comprehensive understanding of the publication landscape within Canadian universities is critical in order to evaluate and establish a benchmark for the academic system's competitiveness abroad. By conducting an extensive examination of publication trends, Canadian academic institutions are able to benchmark themselves against their international counterparts, thereby identifying potential areas for growth, leveraging their advantageous attributes, and elevating their international scholarly reputation. In an age of increased internationalization, when universities are evaluated not only nationally but also internationally, this is of particular importance. Evaluating the current status of publications offers a thorough synopsis of Canada's scholarly endeavors and facilitates the development of approaches to sustain or improve its standing in the international knowledge economy.

It is essential to have a comprehensive comprehension of the current state of publications in order to effectively respond to the changing demands of the academic community, industry, and society as a whole. Through the identification of emerging trends, interdisciplinary collaborations, and areas of convergence, stakeholders possess the ability to make appropriate adjustments to research priorities, educational curricula, and industry partnerships. This comprehension promotes the synchronization of scholarly achievements with the needs of society, guaranteeing that research carried out in Canadian universities continues to be pertinent, influential, and significantly contributes to the resolution of urgent issues.

Methodology

We conducted a Scopus search for "Canada" in the affiliation country field. A total of 2023 documents were taken into account, yielding 129283 results. The Government of Canada's official website, Canada.ca, recommended the website <https://www.cicic.ca/2/home.canada>, which lists a total of 4222 institutions. Following a filter for private (non-profit and for-profit) colleges and universities, 249 results were identified.

Selection Criteria:

- The data considered was restricted to documents published in the year 2023.
- Documents without a clear affiliation with a Canadian institution were excluded.

Selection Process:

- ↓ Used "Canada" keyword in Scopus affiliation country field.
- ↓ 129,283 results narrowed to focus on Canadian higher education.
- ↓ Canada.ca recommended <https://www.cicic.ca/2/home.canada>, listing 4,222 institutions.
- ↓ Applied filter for private (non-profit and for-profit) colleges and universities, resulting in 249 institutions.
- ↓ Selected documents and institutions were analyzed for insights into public and private Canadian higher education publications in 2023.

Results

The academic landscape of Canadian universities is comprehensively examined through a detailed analysis of affiliations, research output, and collaborative efforts. Table 1 presents the academic affiliation landscape in Canada, wherein the University of Toronto emerges as a preeminent establishment boasting a substantial 19,960 affiliations. University of British Columbia (11,658) and Université McGill (9,123) follow closely behind. Additionally, McMaster University, the University of Alberta, and the University of Calgary all make substantial contributions. The University of Toronto Faculty of Medicine (3,614) and the Cumming School of Medicine (2,799) are two institutions that merit special recognition. The aforementioned distribution highlights the heterogeneous and cooperative character of research undertakings among numerous Canadian institutions.

Table 1. Leading academic affiliations in Canada

Affiliation	Number of publications
University of Toronto	19960
The University of British Columbia	11658
Université McGill	9123
University of Alberta	9106
University of Calgary	7251
McMaster University	6700
University of Ottawa	6256
Western University	5799
University of Montreal	5783
University of Waterloo	5376
Université Laval	4284
Queen's University	3909
University of Manitoba	3768
Dalhousie University	3766
University of Toronto Faculty of Medicine	3614
University Health Network University of Toronto	3400
York University	3026
University of Saskatchewan	2948
Simon Fraser University	2859
Cumming School of Medicine	2799

An analysis of 2023 Scopus-indexed documents containing "Canada" in the affiliation country field reveals a wide range of academic research domains (Figure 1). The provided data offers valuable insights into the distribution of publications across diverse subject areas within Canadian universities. Medicine stands out as the predominant field with 43,468 publications, showcasing a significant emphasis on health-related research. Engineering closely follows with 19,982 publications, highlighting a robust focus on technological advancements. Interdisciplinary trends are evident with 3,100 multidisciplinary publications, while Environmental Science's 10,209 publications reflect a blending of biology, chemistry, and physics. Emerging fields such as Computer Science (15,456 publications) and Biochemistry, Genetics, and Molecular Biology (13,565 publications) underscore the increasing importance of technology and biological sciences. Meanwhile, the prominence of Social Sciences (17,913 publications) and Arts and Humanities (6,346 publications) signifies a commitment to understanding societal dynamics and cultural aspects. Business, Management, and Accounting contribute significantly with 4,550 publications, demonstrating a keen interest in commerce and organizational behavior. Health Professions and Nursing together account for 6,562 publications, emphasizing research in healthcare and professional training. However, fields like Veterinary (860 publications) and Dentistry (547 publications) show comparatively lower outputs, suggesting specialized or niche focuses within Canadian universities. Further exploration is needed to understand the quality, impact, and collaboration levels within each subject area for a comprehensive understanding of the Canadian research landscape.

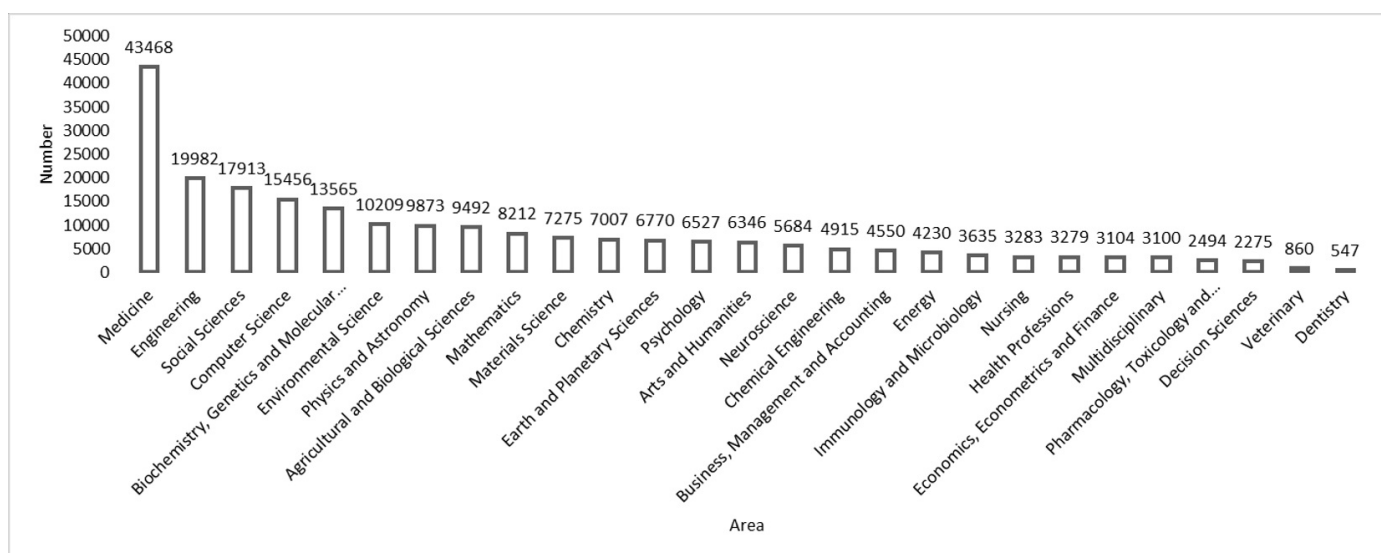


Figure 1. Distribution of research output in Canada (2023) by subject area

The examination of top journals (Table 2) and prolific authors (Table 4) further enriches our understanding of the Canadian research landscape. The prevalence of journals like Scientific Reports and Plos One, alongside prolific authors in diverse fields, underscores the breadth and depth of Canadian academic contributions.

Table 2. Top Journals in Canadian research: number of publications in 2023

Journal	Number of publications
Scientific Reports	879
Plos One	856
Lecture Notes In Computer Science Including Subseries Lecture Notes In Artificial Intelligence And Lecture Notes In Bioinformatics	624
Nature Communications	527
Lecture Notes In Civil Engineering	501
BMJ Open	406
Monthly Notices Of The Royal Astronomical Society	401
International Journal Of Molecular Sciences	363
Science Of The Total Environment	321
CMAJ Canadian Medical Association Journal	319
IEEE Access	316
International Journal Of Environmental Research And Public Health	292
Astrophysical Journal	269
Proceedings Of SPIE The International Society For Optical Engineering	269
Sensors	259
Canadian Journal Of Neurological Sciences	254
Physical Review D	244
JAMA Network Open	234
Frontiers In Psychology	218
Current Oncology	217

Based on the number of publications, Table 3 presents the top 20 authors.

Table 3. Top 20 authors in Canada - 2023

	Author Name	Publications' Number
	Pedrycz, W.	166
	Srivastava, G.	144
	Yamazaki, Y.	128
	Gonnella, F.	126
	Marcisovsky, M.	126
	Milov, A.	126
	Nagai, K.	126
	Perepelitsa, D.V.	126
	Kawade, K.	125
	Koffas, T.	124
	Brau, J.E.	123
	Jones, R.W.L.	123
	Nessi, M.	123
	Orr, R.S.	123
	Cindro, V.	122
	Collot, J.	122
	Filthaut, F.	122
	Gonella, L.	122
	Massarotti, P.	122
	Mikestikova, M.	122

Canada Private Institutions

A subsequent search on Scopus, specifying affiliation with institutions in Canada, yielded only 40 results, as detailed in Table 4. This process aimed to identify and consolidate information on private educational institutions in Canada, emphasizing those affiliated with Scopus.

Table 4. Private universities

Institution	Number of Publications	Sector	Level of education	Legal status
Trinity Western University	95	Non-profit	university	Authorized
University Canada West	75	For-profit	university	Authorized
Concordia University of Edmonton, Alberta	52	Non-profit	university	Authorized
Canadian Memorial Chiropractic College	47	Non-profit	college	Authorized
Yorkville University (British Columbia)	31	For-profit	university	Authorized
New York Institute of Technology	26	Non-profit	college	Authorized
Northeastern University, Toronto/Vancouver	25	Non-profit	university	Authorized
FaithWay Baptist College of Canada	21	Non-profit	theological school	Authorized

St. Mary's University	21	Non-profit	university	Authorized
Adler University	20	Non-profit	university	Authorized
International Business University	20	Non-profit	university	Authorized
Redeemer University	20	Non-profit	theological school	Authorized
Crandall University	18	Non-profit	university	Recognized
Ambrose University	13	Non-profit	university	Authorized
Burman University	9	Non-profit	university	Authorized
Canadian College of Naturopathic Medicine	9	Non-profit	college	Authorized
Quest University Canada	8	Non-profit	university	Authorized
The King's University	8	Non-profit	university	Authorized
Tyndale University	8	Non-profit	theological school	Authorized
Canadian Mennonite University	7	Non-profit	university	Recognized
Regent College	6	Non-profit	theological school	Recognized
Corpus Christi College	5	Non-profit	college	Authorized
Vancouver School of Theology	5	Non-profit	theological school	Recognized
Adler Graduate Professional School	4	For-profit	university	Authorized
Booth University College	4	Non-profit	theological school	Authorized
Collège Jean-de-Brébeuf	4	Non-profit	college	Recognized
City University of Seattle	3	Non-profit	university	Authorized
Columbia Bible College	3	Non-profit	theological school	Registered
Niagara University (Ontario)	3	For-profit	university	Authorized
Pontifical Institute of Mediaeval Studies	3	Non-profit	theological school	Authorized
Sacred Heart College	3	Non-profit	other institution	Not specified
Marianopolis College	2	Non-profit	college	Recognized
Newman Theological College	2	Non-profit	theological school	Authorized
University of Fredericton	2	For-profit	university	Authorized
Acsenda School of Management - Vancouver	1	For-profit	college	Authorized
Alexander College	1	For-profit	college	Authorized
Collégial international Sainte-Anne	1	Non-profit	college	Recognized
Columbia College	1	Non-profit	college	Authorized
Herzing College, Montreal	1	For-profit	college	Authorized
Institute for Christian Studies	1	Non-profit	theological school	Authorized
Montreal Diocesan Theological College	1	Non-profit	theological school	Recognized
National Circus School	1	Non-profit	college	Recognized

Despite the relatively lower number of publications originating from private institutions in comparison to prominent public universities, it is imperative to acknowledge the significant influence that these establishments wield within their specific fields. Prominent public institutions such as Trinity Western University, University Canada West, and Concordia University

of Edmonton, Alberta, serve as examples that illustrate how significant contributions to academic output they can still make despite lacking the publication volume of larger public counterparts. This underscores the necessity of considering quality and impact in addition to quantity when evaluating the academic landscape of private institutions in Canada.

The data presents an interconnected system of private institutions participating in joint research initiatives. The aforementioned collaboration is apparent not solely in the private sector, but also in alliances established with public universities. The establishment of international institutions, including Northeastern University, Toronto/Vancouver and New York Institute of Technology, serves to underscore the worldwide affiliations that these private establishments cultivate. A collaborative effort fosters a diverse array of ideas and perspectives, thereby contributing to a vibrant and interconnected academic environment.

Upon examining publications originating from private institutions in Canada, one can discern a dynamic and heterogeneous research environment (Figure 2). These institutions exhibit a dedication to technological innovation and applied research through their heavy emphasis on "Computer Science" and "Business, Management, and Accounting". Their noteworthy contributions in the domains of "Medicine", "Health Professions", and "Nursing" underscore the profound influence they possess in the realm of healthcare research. Furthermore, a significant presence in the field of "Social Sciences" highlights the active involvement of private institutions in addressing societal concerns and their dedication to comprehending economic dynamics and human behavior. The involvement of scholars from various disciplines and emerging fields such as "Energy", "Environmental Science", and "Decision Sciences" in interdisciplinary research demonstrates a comprehensive and cooperative mindset in tackling intricate problems.

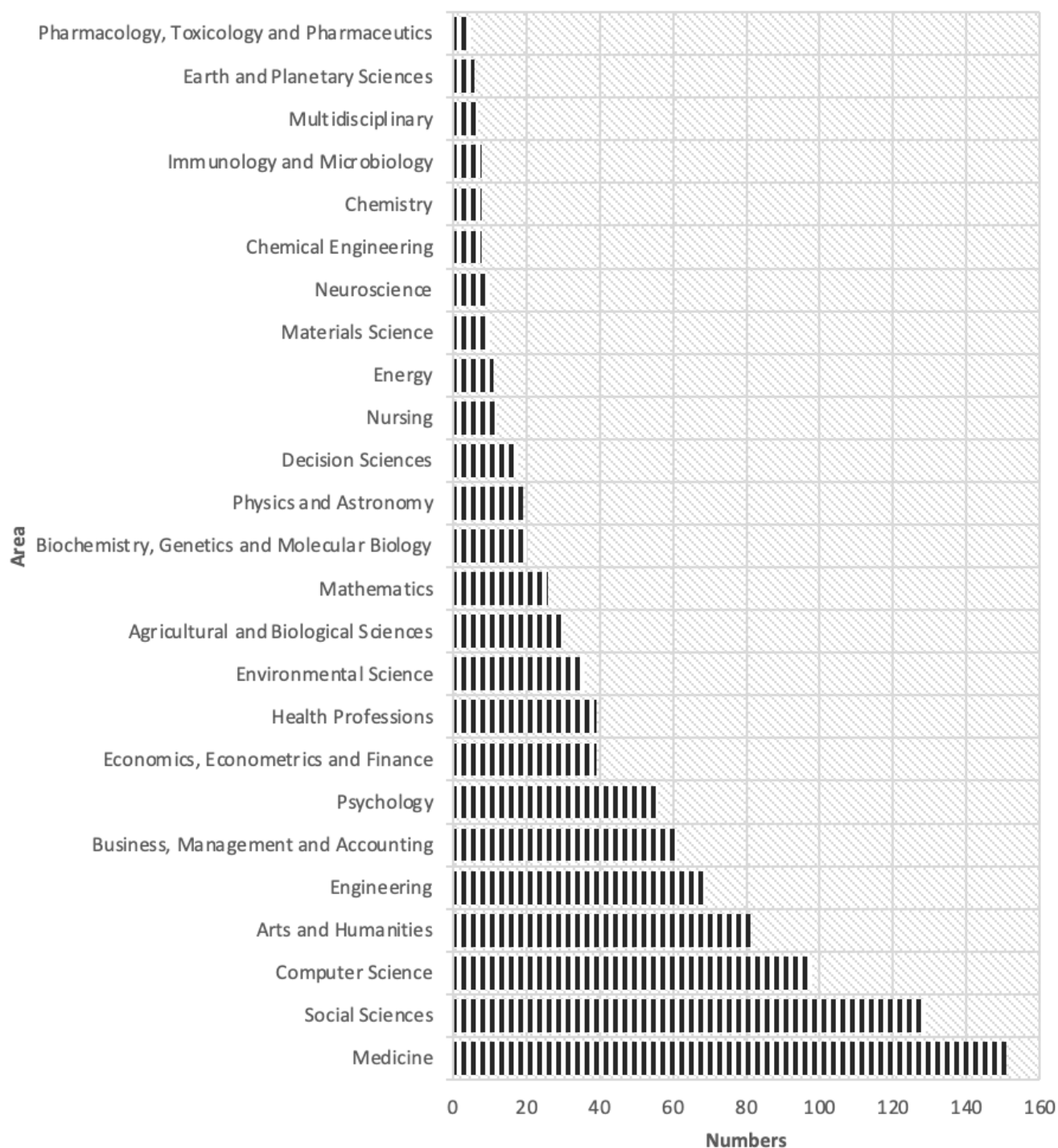


Figure 2. Distribution of research output in Canadian private institutions (2023) by fields

Table 5 shows the top journals according to the number of publications.

Table 5. Top 20 Journals in private Canadian research: number of publications in 2023

Journal	Number of publications
Eai Springer Innovations In Communication And Computing	16
Handbook Of Research On Dissecting And Dismantling Occupational Stress In Modern Organizations	10
Creativity In Counseling Children And Adolescents A Guide To Experiential Activities	9
Mainstreaming Cryptocurrency And The Future Of Digital Finance	9
Chiropractic And Manual Therapies	6
Concepts Technologies Challenges And The Future Of Web 3	6
Financial And Technological Innovation For Sustainability Environmental Social And Governance Performance	6
Journal Of Occupational Rehabilitation	6
Quality Of Life Research	6
Christian Environmentalism And Human Responsibility In The 21st Century Questions Of Stewardship And Accountability	5
Electronics Switzerland	5
Lecture Notes In Networks And Systems	5
2023 IEEE 14th Annual Ubiquitous Computing Electronics And Mobile Communication Conference Uemcon 2023	4
Computers In Libraries	4
International Journal Of Environmental Research And Public Health	4
Journal Of The Canadian Chiropractic Association	4
Transformational Leadership Styles For Global Leaders Management And Communication Strategies	4
2023 International Conference On Computing Networking And Communications Icncc 2023	3
Assessment Of Online Learners Foundations And Applications For Teacher Education	3
BMJ Open	3

Table 6 covers the top 20 authors based on their number of publications.

Table 6. Top 20 authors in Canada - 2023

Author Name	Publications' Number
Taherdoost, H.	42
Sawatzky, R.	19
Mior, S.	11
Wong, J.J.	11
Côté, P.	9
Fletcher, T.B.	9
Shearer, H.M.	9
Southerst, D.	9
Cancelliere, C.	8
Hincapié, C.A.	8
Hogg-Johnson, S.	8
Verville, L.	8
Aibin, M.	7
Connell, G.	7
Ng, A.	7
Young, J.J.	7
Yu, H.	7
Abdallah, E.G.	6
Brunton, G.	6
Bussi�res, A.	6

Figure 3 illustrates the diverse academic contributions in Canadian research for 2023, highlighting 324 articles, 82 book chapters, 52 reviews, and 38 conference papers among various document types.

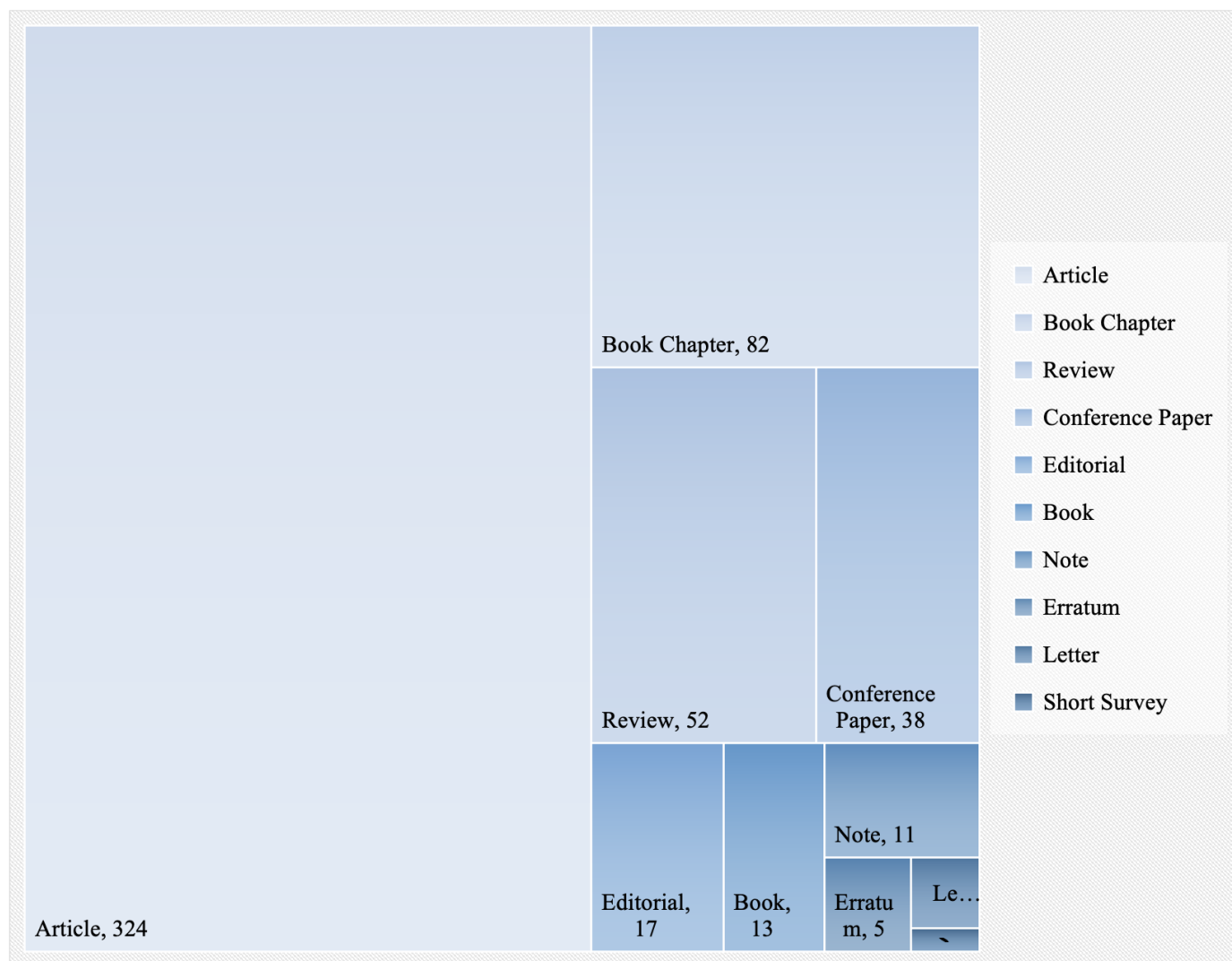


Figure 3. Document types and contributions in private Canadian research (2023)

Conclusion

By examining academic affiliations and research output in Canada, as documented in Scopus data, a thorough comprehension of the nation's collaborative and heterogeneous research environment can be obtained. A substantial volume of 129,283 documents was evaluated in 2023, demonstrating the considerable impact that Canadian institutions have had on international research.

An examination of private educational institutions in Canada unveils their significant contributions, although they have produced a comparatively smaller number of publications in contrast to prominent public universities. These establishments, including Trinity Western University and University Canada West, demonstrate a dedication to a variety of disciplines, including health, management, and business. Additionally, the collaborative nature of private institutions, which engage in partnerships and global connections, is highlighted in the analysis.

The emphasis that both public and private institutions place on emerging disciplines such as Energy, Environmental Science, and Decision Sciences demonstrates a proactive and comprehensive approach to research. The significance of

interdisciplinary research in Canada highlights the nation's dedication to tackling intricate problems using interdisciplinary collaboration.

In summary, the analysis validates the vitality and worldwide influence of research conducted in Canada. Public institutions take the lead, with the assistance of private institutions that make a variety of contributions. Canada's research terrain exhibits a harmonious coexistence of established disciplines and burgeoning fields, thereby demonstrating the nation's flexibility and dedication to advancement. The collaborative ethos exhibited in domestic and international partnerships further establishes Canada as a major participant in the international research community.