



Sustainability Engineering Collection Assessment: A Citation Analysis of Faculty Publications at McGill University

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Introduction

Sustainability is an emerging aspect in many engineering disciplines, encompassing social concerns of human health and welfare, as well as ecological issues of environmental stewardship (Abraham, 2006).

The Trottier Institute for Sustainability in Engineering and Design (TISED) at McGill University promotes interdisciplinary research to develop solutions to sustainability challenges

Diverse research materials are required to support this rapidly growing, multifaceted research area

Study Aims

- Investigate research materials used by TISED faculty members
- Outline important and influential resources in the research area of sustainability engineering
- Identify existing gaps in McGill Library's collection through a mixed-methods approach: citation analysis of TISED faculty publications and interviews with TISED researchers

Methods - Citation Analysis

- Representative sampling of 200 publications from 2012-2014 by TISED researchers
- 6465 references from source citations exported from Scopus
- Factors analyzed quantitatively: age of cited resources, type of resource, and the current McGill holdings
- Bradford's Law applied to identify core journals in each discipline

Methods - Interviews

- Interviews with TISED faculty conducted in order to develop a more comprehensive understanding of how the collection meets their research needs.
- Participant recruitment via emails to the TISED listserv and flyers distributed to faculty mailboxes
- Semi-structured interview duration of 10-15 minutes, audio-recorded
- Interview transcriptions analyzed by identifying themes and trends

Results - Citation Analysis

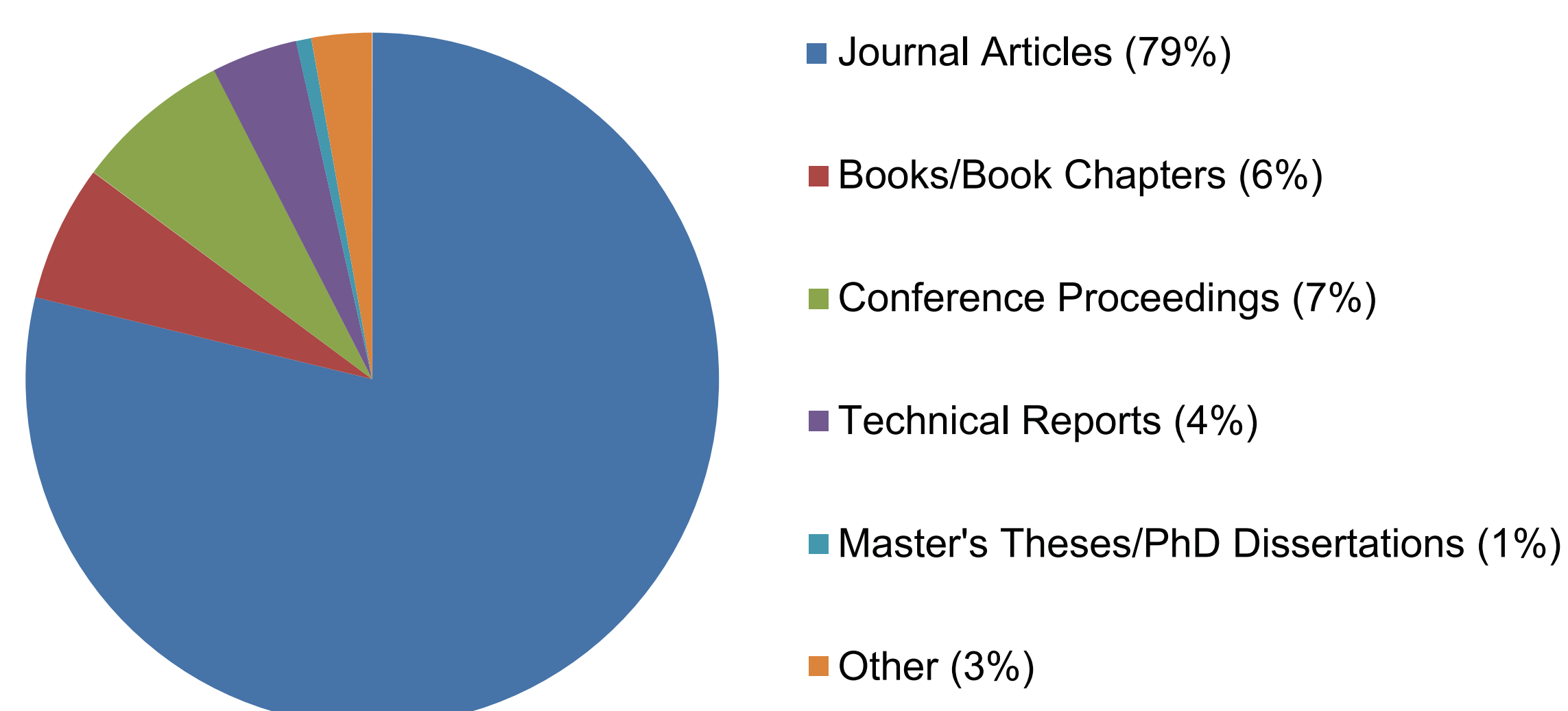


Figure 1 - Distribution of citations by resource type

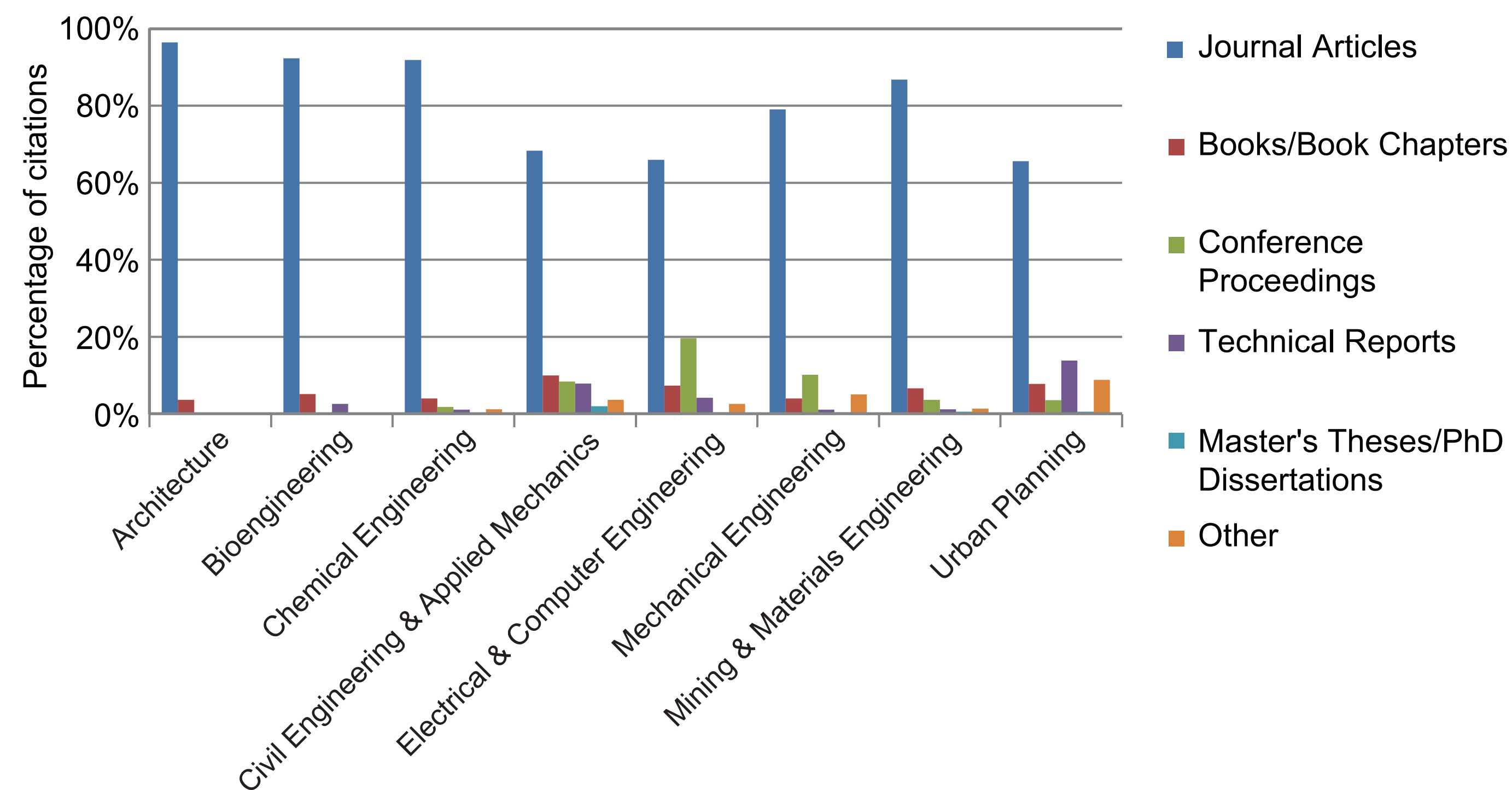


Figure 2 - Distribution of resource types by discipline

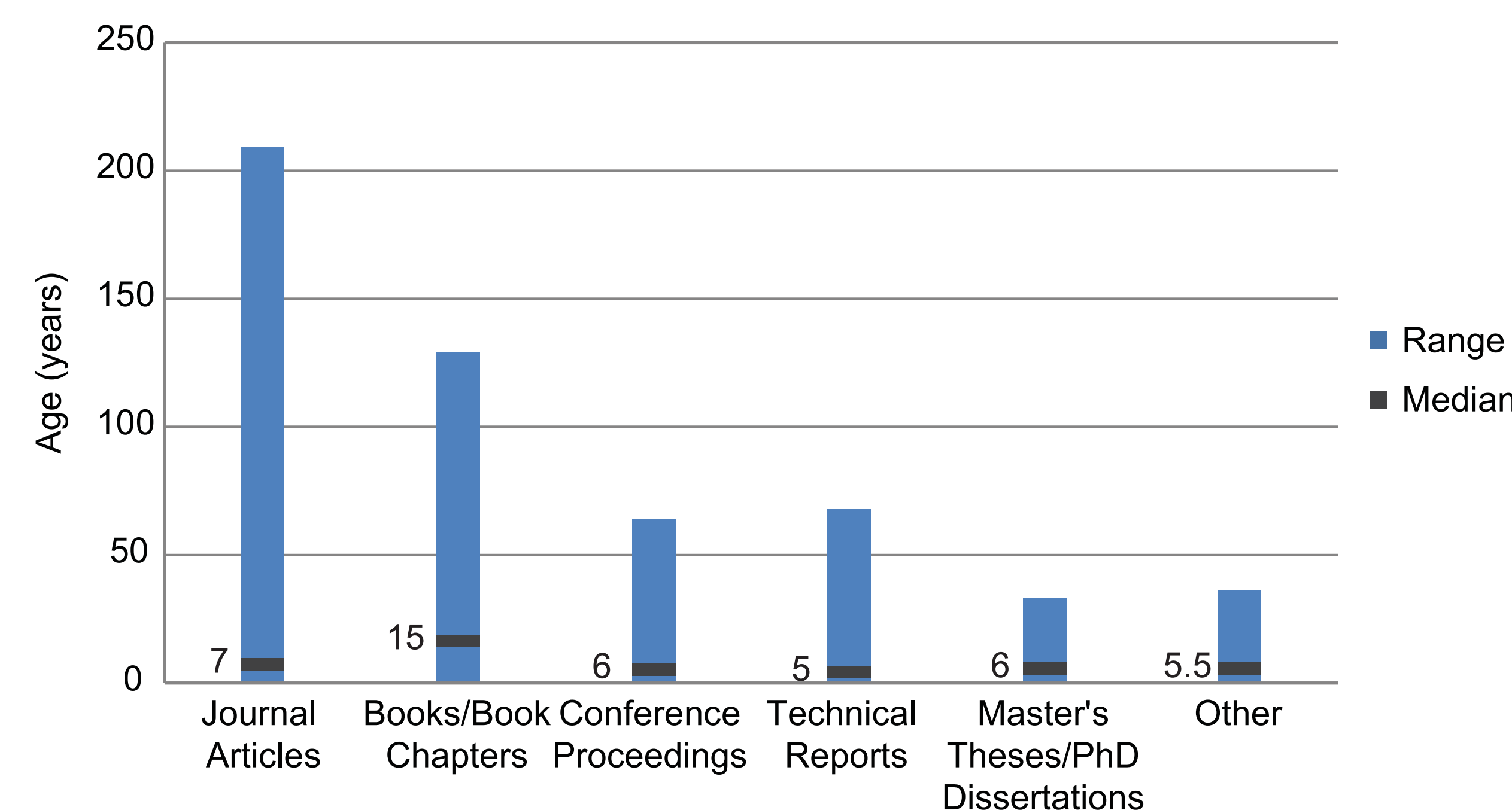


Figure 3 - Median and range of citation age by resource type

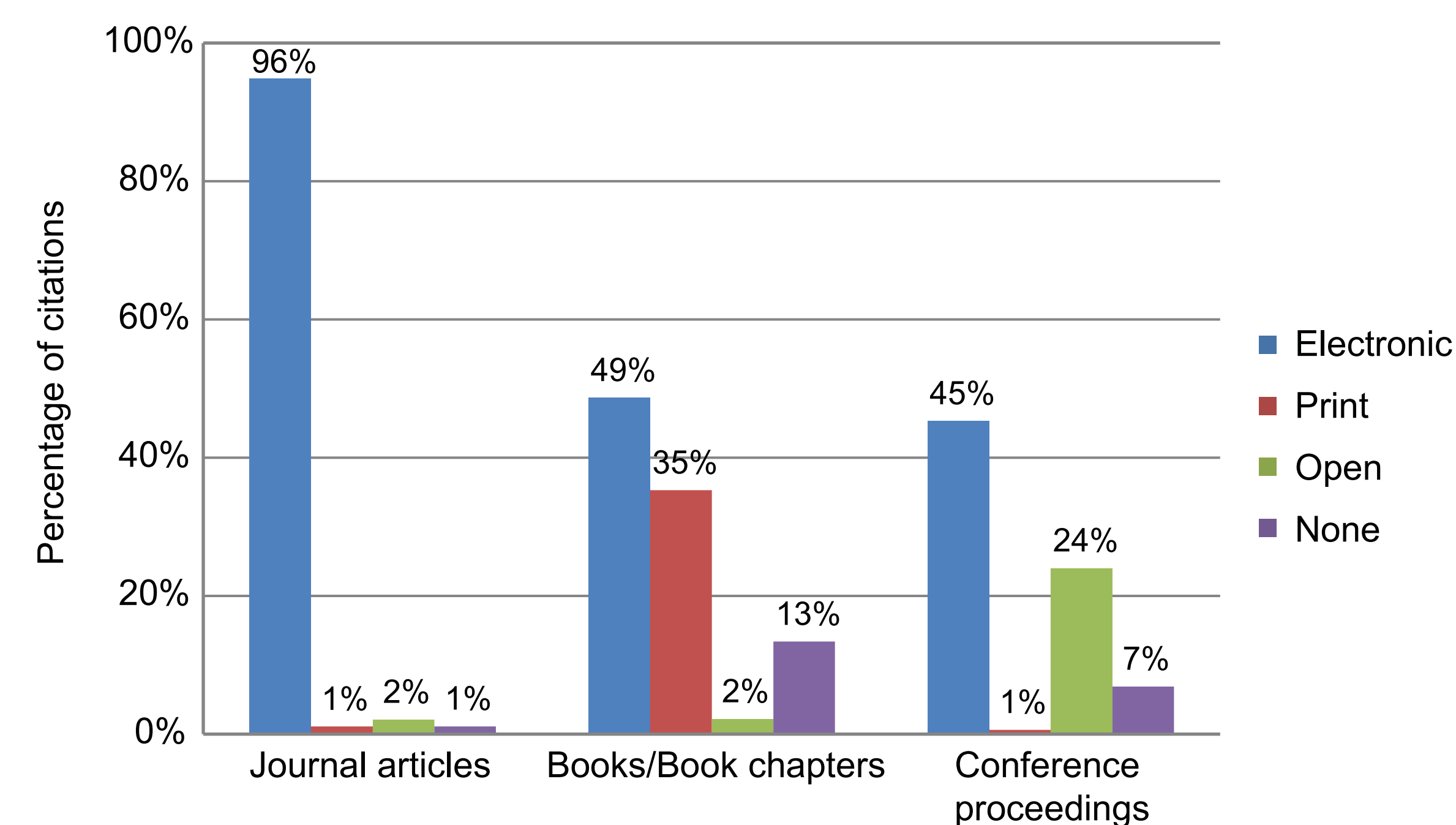


Figure 4 - Collection holdings by resource type

Table 1 - Scattering of journals and citations over Bradford Zones

Zone	Number of Journals	Number of Citations	% Journals	% Citations
1	45	1695	3.5%	33.3%
2	185	1693	14.4%	33.3%
3	1058	1695	82.1%	33.3%
Totals	1288	5083	100%	100%

Ratio of 1:4:23 close to Bradford's distribution of 1:4:16 (1:n:n²)

Table 2 - Top 10 core journals in Bradford's Nuclear Zone for all disciplines

Journal Title	Citation Count
Environmental Science and Technology	148
Applied Physics Letters	79
Water Research	69
Transportation Research Board	67
Optics Express	56
Langmuir	52
Chemosphere	46
Wear	45
Nano Letters	45
Journal of Applied Physics	45

Broad scope of many core journals cover a range of disciplines, reflecting mandate of TISED

Results - Interviews

- Three interviews with TISED faculty members from Architecture, Chemical Engineering, and Electrical and Computer Engineering, analyzed qualitatively
- Overall, faculty are highly satisfied with the McGill collection for research and teaching
- Extremely rare for members to experience barriers accessing materials
- 200+ year age range for citations linked to trend in returning to foundational resources to reassess inefficient engineering processes
- Interdisciplinary collaboration will be essential for developing creative solutions for sustainability challenges
- Suggestion for McGill Library to provide space for interdisciplinary collaboration and showcasing technologies

Conclusion and Discussion

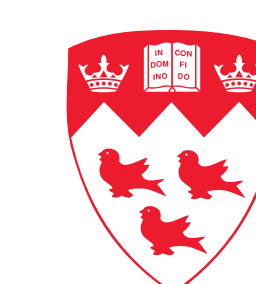
- Journal articles amounted to 79% of citations by TISED faculty, in contrast to studies on engineering student theses, such as Brush (2015) (57%) and Fransen (2012) (48%).
- 13% of Books/Book Chapters and 7% of conference proceedings were not available through McGill's subscriptions or through open access channels, indicating an area for collection improvement
- Given the trend in returning to foundational texts, electronic access to these important resources is essential for research on sustainability
- McGill Library could consider initiatives to encourage interdisciplinary collaboration, perhaps integrated with "Research Commons"

Future Work

- Results will inform engineering librarians' decisions on building engineering collections that are more responsive to user needs within and beyond the McGill Library
- Repeat citation analysis and interviews yearly to monitor the needs of the faculty for research and teaching

References

- Abraham, M. A. (2006). Principles of sustainable engineering. In M. A. Abraham (Ed.), *Sustainability Science and Engineering: Defining Principles* (pp. 3-10). Boston: Elsevier.
- Brush, D. A. (2015). Engineering Master of Science Theses at Rowan University: A Citation Analysis of the First Nine Years. *Science & Technology Libraries*, 34(2), 109-121.
- Fransen, J. (2012). Literature use in engineering and computer science research: An analysis of works cited in dissertations and theses. *Issues in Science and Technology Librarianship*, 71.



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