Book Citations in PhD Science Dissertations: An Examination of Commercial Book Publishers' Influence

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Abstract

This case study examines the book citations of PhD dissertations from the City University of New York (CUNY). The study spans a ten-year period from 2008–2017 and includes 9,307 book citations sourced from 916 dissertations. Book citations were chosen from seven science subjects. Publishers were identified in order to examine trends and quantify the role of commercial publishers in book selections used to support dissertation research.

Introduction

This case study examines the book citations of PhD dissertations awarded at the City University of New York (CUNY). The study spans a ten-year period from 2008–2017 and includes seven subject categories: biological sciences, chemistry, computer science, engineering, environmental science, mathematics, and physics. Book citations and publishers were identified in order to examine trends and quantify the role of commercial publishers in book selections used in doctoral dissertation research.

Doctoral dissertations represent a unique class of research that serves as a capstone to years of academic study and training. Dissertations are proof that the doctoral candidate is ready to take on professional-level academic work and contribute to the scholarship in their respective field. The underlying dissertation citations are foundational to high quality research and are used to support theory, methodology, and quantitative study. They are the connection between what has come before and emerging areas of study. Dissertations often become important academic works themselves, as journal articles, or published books. Authors of dissertations are creators and consumers of scholarly work beyond the dissertation process

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and are influencers in purchasing library collections. Thus, it is important to examine the role of commercial publishers and their influence on dissertation research.

Much has been written about the state and evolution of scholarly publishing as library budgets have flattened or shrunk and as technology transitions content away from print. Because of the history of available bibliometric data for journals through tools like Web of Science, Scopus, and Journal Citation Reports, few studies focus solely on books. Therefore, this case study will examine how the current challenges facing the scholarly book market have registered in dissertation research. It will explore the extent to which commercial publishers dominate PhD researchers' utility of books. It will identify differences in citations patterns among the different science disciplines and how other publisher types fare in comparison to commercial publishing.

Literature Review

Science Citations and Citation Analysis of PhD Dissertations

This case study employs citation analysis to examine the role of commercial publishing in dissertation research. The importance of citations as a foundation for scholarly works has long been recognized and has an expansive history. Cronin mentioned in his 1984 book on the role and significance of citations in scholarly works of science, "Citation analysis can be employed to establish the pedigree of ideas, and to unravel networks of scholarly interaction" (26). Cronin continues:

> In any scientific field the existing "body of knowledge" is an accumulation of distilled insight, theoretical constructs, experimentally derived data and empirical observations. The published literature of a subject field is a selective, edited and approved inventory of that knowledge, and if intelligently schematised it can display the geneaology of achievement within the field. (26)

Accordingly, "citation is part of the social process of science," where the relationships among the cited and citing of documents is of upmost importance, especially in dissertations. Peer-reviewed research that examines citation analysis studies note that the aims and scopes of such studies tend to vary widely (Ashman 2009), and a lack consistency exists in the methodologies employed (Hoffmann and Doucette 2012). This literature review briefly summarizes citation studies of PhD dissertations in the sciences, showing the variety of subjects covered and the range of scopes.

Kelly (2015) examined citation patterns in multiple engineering subjects in order to develop a serial/monograph ratio for library collections. Sinn's (2005) analysis had a similar purpose but focused on mathematical and statistical dissertations. Eckel (2009) studied engineering dissertations at Western Michigan University to compare graduate and doctoral

research patterns. Zhang (2013) compared citations of chemistry and chemical engineering dissertations to demonstrate how to conduct a local use study. Gooden (2001) examined chemistry doctoral dissertation citations to quantify type of format used by PhD researchers. Johnson (2013) looked at engineering dissertation citations to determine if there was increased use of web content over the time period from 1989–2011. Other articles studied citation analysis of dissertations for the explicit purpose of assessment and development of collections (Abeyrathne 2015; Vallmitjana and Sabaté 2008; Beile, Boote, and Killingsworth 2004; Edwards 1999). Many of these studies suffer from small sample sizes and often focus on only one or two subject areas. However, because of access issues, often local analysis of the researchers' own institution's dissertation collections is the only viable option. Thus, the scope is limited by access. Some studies have larger data sets. Kayongo and Helm (2012) analyzed citations of a wide variety of subjects from both social sciences and science subjects in order to determine the adequacy of their institution's library collection in supporting dissertation research.

Two relatively large case studies of PhD dissertation citations in four science subjects were recently conducted at The Ohio State University. The first study included all citation formats for a five-year period with the aim of assessing researcher preferences in types of materials: books, articles, conference papers, et cetera (Dotson and Franks 2015). Their second examination focuses exclusively on books cited by dissertations from 2003 to 2012, without regard for age or format of the book. The aim of this case study was to assess publisher categories of citations to inform collection development. The results show commercial book publishers were the most frequently used for the science disciplines studied, accounting for 73% of the citations (Franks and Dotson 2017). The analysis undertaken for this paper builds a similar case, but for CUNY PhD science dissertation citations, in order to demonstrate the influence of commercial publishers on collections compared to other categories. Though publisher influence has implications for collections, this study differs from Franks and Dotson in that it is not designed to inform collection management but to bring awareness to the current publishing market's dominance in these areas of dissertation research.

This study's constraints are also similarly limited in scope to the doctoral degree offerings of the researcher's institution and the resulting dissertations; however, CUNY is one of the largest urban university systems in the United States, with thirty doctoral programs and twenty-four campuses. Thus, the number of subjects covered and the resulting number of citations and dissertations are relatively large, even given the exclusion of nonbook formats.

Books are a common device for disseminating pioneering research and knowledge in academia and are the subject of this case study. Scholarly

books represent academic output that has not been studied to the extent that journals have (Zuccala et al. 2015; Kousha and Thelwall 2015). Though efforts have recently been made to construct book publisher rankings based on bibliometric evaluation, it is still an emerging area of study (Salinas et al. 2015)

Scholarly Book Publishing

Libraries and publishers have a shared history. They have evolved together, and their futures are interconnected (Jensen 2008). Currently, the relationship between libraries and publishers is fraught with tension due to shrinking library budgets and rising prices charged by publishers. Yet there is more to this story as commercial publishers are now responsible for a greater share of scientific output than in the past, and a large percentage of this output can be attributed to the top five publishers (Larivière, Haustein, and Mongeon 2015). Scientific output has grown at a pace of eight to nine percent each year, effectively a doubling of global scientific output almost every nine years (Bornmann and Mutz 2015). Commercial publishers publish more titles than university presses, about four commercial books for every one university press book title, and the ratio may even be greater given observations in science fields like mathematics and physics (Greco and Spendley 2016).

The publishing market has also been consolidating for decades, meaning fewer choices among publishers, putting libraries at a disadvantage. A recent, notable example is 2015's merger of Springer Nature and Macmillan Science and Education, a deal reportedly worth $1.7 billion. Springer was itself bought out by BC Partners just two years before for $3.8 billion (Chawla 2015). Such large mergers, and smaller acquisitions throughout the years, have decreased competition in the scholarly communication market (Altman and Avery 2015). Some have called for university presses to adopt open access business models, and others have suggested ways of stabilizing or reducing the amount libraries pay for scholarly communications and scholarly books (Greco and Wharton 2010; Schonfeld 2017). A similar debate is happening with scholarly journals, with the same dynamic among publishers, scholars, and libraries. Some scholars claim that academic library budgets are able to fully fund open access initiatives (Morrison 2013).

It is evident commercial publishers are reaping large benefits from the current situation. Liu and Gee (2017) argue their recent analysis confirms commercial publishers overcharge libraries by a large margin in all subject areas. Other examinations of book publishers have shown that commercial publishers are price markers in the scholarly book market; thus, they can and do charge more per book title than university presses (Greco and Simson 2018; Greco and Spendley 2016; Greco, Wharton, and Sen 2012). High profit margins have been observed in scientific publishing.

One egregious example is Elsevier, with a profit margin as high as 40% in past years (Buranyi 2017).

Market research tracking the science, technical, and medical (STM) book market have seen flat or declining growth in the past few years, and slow growth going forward (Ware and Mabe 2015; Simba Information 2016). However, there is considerable growth expected for electronic platforms for STM content: Simba Information expects 30% growth from 2016 to 2020. This will not alleviate the pressures on library budgets, as evidence has shown that the prices of ebooks are higher than print copies (Rao, Tripathi, and Kumar 2016; Rao, Kumar, and Tripathi 2018).

In effect, there is more scientific output, higher prices, less competition, and more bundling of technology and content. The efficacy of continuing traditional publishing models in scholarly communication, under the influence and large benefit of a few, large dominant players, warrants serious consideration.

Methodology

A complete list of CUNY dissertation citations in XML format was provided by ProQuest drawn from the Dissertations & Theses (PQDT) database. The dissertation citations were identified and drawn from the ProQuest Subject Categories in "Behavioral, Natural, and Physical Sciences." ProQuest ascribes multiple subject headings to each dissertation, sometimes up to three. The dissertations were cross-checked against their affiliated CUNY academic department, which are referenced to define the subject categories. Seven categories were chosen for the case study: biological sciences, chemistry, computer science, engineering, environmental science, mathematics, and physics.

ProQuest ascribes publication type—"Book," "Journal," "Conference Report," et cetera—to each citation. Of the complete list of citations provided, the "Book" format/publication type was used for analysis. Also, it should be noted that another category—"Book Article/Chapter"—was not included. This effectively removed lower priced monographs and conference proceedings from the analysis, those titles that ostensibly constitute less of an economic burden to libraries than do other books. Though costs and price models are not well-established, research is beginning to address this (Maxwell, Bordini, and Shamash 2017; Maron et al. 2016). The exclusion of monographs is one difference between the Franks and Dotson case study and this study.

A fair amount of cross-checking references was also required to weed out citations miscategorized as books. All told, 9,307 book citations were identified from 916 dissertations published at CUNY from 2008 to 2017. About 83% of dissertations cited books.

As Hoffmann and Doucette (2012) noted, there exists a lack of consistency and transparency in methodology for citation studies. This case study observed the methodology of Franks and Dotson's recent citation

analysis with similar scope and subject (Franks and Dotson 2017). An effort was made to adhere to the publisher categories provided by Franks and Dotson and follows much of their logic for defining and grouping publishers. CUNY citations were assigned one of the following seven citation categories: Academic, Commercial, Government, Organization, Society, University Press, and Other. Commercial publishers include corporate entities of all revenues, sizes, and markets involved in publishing activities. University press includes those publishers with an affiliation with a university. This is to be distinguished from academic publishers, which are publishing activities associated with universities, their departments, and affiliated entities, but are not under the purview of the university press. Organizations as publishers include corporations that are not publishers but do produce books. Government includes those books that were published by the US government, other governments, governmental agencies, as well as international bodies with government oversight, and research laboratories or organizations affiliated with governments. Other includes mostly unidentified publishers, but also self-published books. Books were included without regard for age and format.

Ulrichsweb was used to verify publication status and help define major categories of publishers. Library search systems, databases like Ulrich's and WorldCat, as well as web search engines were consulted where citations were not clear or incomplete. Web searches mostly consulted Amazon, Wikipedia, and publisher websites and their book catalogs.

Books publishers were only assigned one category. The current ownership structure of the commercial publishers was observed as opposed to identifying past corporate affiliations. Springer and MacMillan were categorized as separate entities.

Results

All Disciplines

On average, about ten books were cited per dissertation across the categories. Table 1 shows the number of dissertations and book citations per subject area. This is in keeping with past studies and the percentages of books cited in science dissertations (Kelly 2015; Zhang 2013). Environmental science cited the most books per dissertation by quite a wide margin at 19.36%.

Citation percentages in this case study can be compared to an analysis by Elsevier of the Thomson-Reuters Journal Citation database, which proportioned article output by type of publisher: commercial publishers (including publishing for societies) were 64%; society publishers, 30%; university presses, 4%; and other publishers 2% (Ware and Mabe 2015). Similarly skewed proportions exist in book citations for this study of PhD dissertations, though similar analysis for books does not exist. Relatively recent editions to bibliometrics like the Web of Science Book Citation Index, the inclusion of books in Google Scholar, and studies establishing

Table 1. Dissertations and Citations by Science Subject

Subject	Dissertations	Book Citations	Book Citations / Dissertation
Environmental Science	53	1,026	19.36
Biological Sciences	234	2,578	11.02
Chemistry	144	1,481	10.28
Engineering	147	1,377	9.37
Computer Science	106	970	9.15
Physics	129	1,108	8.59
Mathematics	103	767	7.45
Total	916	9,307	10.16

bibliometrics for books may signal comparison will be possible in the future (Zuccala et al. 2015).

Table 2 provides the number and percentage of citations by book publisher category. Commercial publishers were the most commonly cited, followed by the university presses. These two categories combined make up over 80% of book citations.

Compared to the Franks and Dotson study, the aggregate numbers are similar, though their total citations from commercial publishers and university presses was higher—91.7%. Commercial publishing accounts for just over 60% of book citations in this case study, whereas Franks and Dotson found that about 70% of book citations could be attributed to commercial publishers. This is a difference of about 13% (Franks and Dotson 2017). Another notable difference between these results and the Franks and Dotson study is that the number of government publication citations was miniscule—less than 1% of book citations in the Franks and Dotson study. In this case study, government book citations rank third, with 7%. The explanation may be attributed to the scope of this study and the inclusion of three more subject areas where researchers utilized books published by governments more often. This is especially skewed by the inclusion of environmental sciences.

However, the differences cannot solely be explained by the subjects covered. A summary of publisher categories for CUNY citations for just those subjects most similar to those in the Franks and Dotson study—civil

Table 2. Book Publisher Citation Categories for all Subjects

Category	Citations	Citation Percentage
Commercial	1,199	46.5%
Commercial	5,590	60.1%
University Press	1,884	20.2%
Government	663	7.1%
Organization	524	5.6%
Society	402	4.3%
Academic	130	1.4%
Other	114	1.2%
Total	9,307	100%

engineering, computer science, physics, and mathematics—show more alignment of the two studies' results.

A couple of other considerations may also contribute to the difference. First, Franks and Dotson included monographs, which were excluded here. Second, the differences could be institutional, CUNY versus OSU. Whether those differences ultimately lie in the institutions, the PhD candidates, or the library collections is ripe for speculation.

Table 3 provides the ranking of book citations by the cited publisher, with aggregates for the top five and ten publishers. The top cited book publisher is Springer, which happens to be in the top five in each of the seven subject categories. Each subject category ranking will be covered separately in its own section. Top five and ten publisher categories show the dominance of a few publishers, 40.7% and 52.3%, respectively.

Rankings of publishers and distributions of book citations to publisher categories varied considerably among the subject areas. This is evident from table 4, showing a big difference in the number of book citations derived from commercial publishers. Chemistry had the largest number of commercial book citations, almost twice as many as environmental science, which had the least amount of commercial book citations. With all subjects combined, commercial publisher books make up 60% of citations.

Table 3. Publisher Rankings by Citation and Percentage

Publisher	Citations	Citation Percentage
Springer	1,115	12.0%
Wiley	937	10.1%
Elsevier	760	8.2%
Taylor & Francis	501	5.4%
Cambridge University Press	474	5.1%
Oxford University Press	365	3.9%
Pearson	319	3.4%
McGraw-Hill	169	1.8%
Kluwer	115	1.2%
MacMillan	110	1.2%
Top 5 Publishers	3,787	40.7%
Top 10 Publishers	4,865	52.3%

Table 4. Subjects Ranked by Commercial Citation Percentage

Subjects	Percentage of Commercial Publisher Book Citations
Chemistry	83.6%
Physics	71.0%
Mathematics	68.7%
Computer Science	63.0%
Engineering	61.1%
Biological Sciences	46.5%
Environmental Science	37.7%
All Subjects	60.0%

Table 5 shows this distribution of commercial book citations throughout the ten-year period of this case study.

Table 5. Percentage of Commercial Book Citations / All Citations

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
All Subjects	63%	60%	68%	63%	56%	57%	55%	59%	67%	56%
Biological Sciences	40%	46%	54%	49%	48%	47%	41%	50%	49%	38%
Chemistry	89%	91%	84%	85%	84%	79%	87%	82%	80%	74%
Computer Science	65%	75%	53%	70%	67%	60%	58%	61%	60%	64%
Engineering	62%	63%	71%	65%	50%	50%	71%	53%	100%	N/A
Environmental Science	48%	40%	41%	26%	32%	41%	37%	26%	59%	15%
Mathematics	69%	69%	77%	77%	64%	58%	66%	67%	74%	65%
Physics	70%	70%	79%	68%	72%	76%	66%	68%	72%	67%

Biological Science

Table 6 shows there were 2,578 books cited from the biological sciences, which includes 234 dissertations from the CUNY academic departments of biology and biochemistry. This represents the largest group of dissertations and citations in the study, but the second lowest number of citations attributed to commercial publishers at 46.5%. Because of this, book citations from University Press, Organizations, and Government contribute a relatively larger share compared to the other subject categories.

University presses were responsible for 26.6% of book citations, and contribute four publishers to the top ten book publishers cited, with Oxford University Press topping the list, as shown in table 7. Biological science also has the lowest percent attributed the top five and ten ranked publishers, at 22% and 30.7%, respectively.

Table 6. Distribution of Book Citations by Publisher Categories for Biological Sciences

Category	Citations	Citation Percentage
Commercial	1,199	46.5%
University Press	687	26.6%
Organization	286	11.1%
Government	206	8.0%
Society	81	3.1%
Other	69	2.7%
Academic	50	1.9%
Total	2,578	100%

Chemistry

Table 8 shows there were 1,481 chemistry citations included in this study, derived from 144 dissertations. Of the subjects covered, chemistry had the largest percentage of commercial publisher influence on book citations, with 83.6%. As a result, university presses had the lowest showing of the

subject categories. As shown in table 9, the top five publishers made up 62.9% of citations, and top ten publishers accounted for 71.8% of citations. Wiley was the top ranked cited book publisher, at 20.9%. The top four publishers are commercial: Wiley, Elsevier, Springer, and Taylor & Francis all have double-digit percentages of citations. Oxford University Press is the fifth most cited publisher, but only at 2.4%.

Table 7. Biological Sciences Book Publisher Ranking

Publisher	Citations	Citation Percentage
Oxford University Press	126	4.9%
Springer	122	4.7%
Wiley	118	4.6%
Elsevier	104	4.0%
Taylor & Francis	96	3.7%
Cambridge University Press	75	2.9%
MacMillan	51	2.0%
Columbia University Press	36	1.4%
Princeton University Press	35	1.4%
Pearson	28	1.1%
Top 5 Publishers	566	22.0%
Top 10 Publishers	791	30.7%

Table 8. Distribution of Book Citations by Publisher Categories for Chemistry

Publisher Type	Citations	Citation Percentage
Commercial	1,238	83.6%
University Press	100	6.8%
Society	55	3.7%
Organization	42	2.8%
Government	30	2.0%
Other	8	0.5%
Academic	8	0.5%
Total	1,481	100%

Table 9. Chemistry Book Publisher Ranking

Publisher	Citations	Citation Percentage
Wiley	310	20.9%
Elsevier	215	14.5%
Springer	200	13.5%
Taylor & Francis	172	11.6%
Oxford University Press	35	2.4%
Pearson	30	2.0%
Kluwer	28	1.9%
McGraw-Hill	25	1.7%
Cambridge University Press	24	1.6%
RR Donnelly	24	1.6%
Top 5 Publishers	932	62.9%
Top 10 Publishers	1,063	71.8%

Computer Science

There were 103 dissertations in the computer science subject category included in this study, contributing 767 citations to the analysis. Commercial publishers made up 63% of the citations, and 25.8% of citations were attributed to university presses (see table 10).

Of the commercial publishers, Springer topped the citation ranking responsible for 16.4% of citations in this subject, about twice more than any other single publisher (see table 11). The top five publishers made up 48.9% of citations, and the top ten made up 66.5% of citations. The top four publishers were commercial publishers. MIT Press ranked fifth, contributing 6.9% of book citations in computer science dissertations.

Table 10. Distribution of Book Citations by Publisher Categories for Computer Science

Publisher Type	Citations	Citation Percentage
Commercial	611	63.0%
University Press	250	25.8%
Organization	32	3.3%
Society	31	3.2%
Government	22	2.3%
Academic	19	2.0%
Other	5	0.5%
Total	970	100%

Table 11. Computer Science Book Publisher Ranking

Publisher	Citations	Citation Percentage
Springer	159	16.4%
Wiley	85	8.8%
Pearson	82	8.5%
Elsevier	81	8.4%
MIT Press	67	6.9%
Cambridge University Press	60	6.2%
Oxford University Press	42	4.3%
Taylor & Francis	33	3.4%
Kluwer	22	2.3%
MacMillan	14	1.4%
Top 5 Publishers	474	48.9%
Top 10 Publishers	645	66.5%

Engineering

Of the 147 engineering dissertations included in this study, 1,377 books were cited. Commercial publishers were responsible for 61.1% of these citations (see table 12). University presses were responsible for 17.4% of book citations, and government publications 9%.

Table 13 shows that commercial publishers were the top four contributors of book citations in engineering dissertations, with Cambridge University Press ranking fifth. Top five and ten publishers made up 43.3% and 58.5% of the book citations, respectively.

Table 12. Distribution of Book Citations by Publisher Categories for Engineering

Publisher Type	Citations	Citation Percentage
Commercial	841	61.1%
University Press	239	17.4%
Government	124	9.0%
Society	83	6.0%
Organization	60	4.4%
Academic	22	1.6%
Other	8	0.6%
Total	1,377	100%

Table 13. Engineering Book Publisher Ranking

Publisher	Citations	Citation Percentage
Wiley	162	11.8%
Elsevier	139	10.1%
Springer	128	9.3%
Taylor & Francis	89	6.5%
Cambridge University Press	78	5.7%
Pearson	77	5.6%
Oxford University Press	46	3.3%
McGraw-Hill	43	3.1%
Kluwer	32	2.3%
MIT Press	12	0.9%
Top 5 Publishers	596	43.3%
Top 10 Publishers	806	58.5%

Environmental Science

Environmental Science presented an interesting deviation from the other subject categories in this study. First, 53 environmental science dissertations were included in this study, with 1,026 citations. This represents the most book citations per dissertation of all the subjects (see table 1).

The cited book publisher categories are also interesting, with commercial publishers only contributing 37.7% of the environmental science citations, the lowest of all the subject categories (see table 14). Government citations came in second, with 26.5%. This is the only subject category that deviates from the trend of university presses ranking second for citation attribution. Still, university presses contribute 20.4% of book citations.

Table 15 shows Cambridge University Press books were cited the most, with 5.9%. The top five and ten publisher books were cited only 23.3% and 31%, respectively, representing the lowest publisher dominance of the subject categories in this study.

Table 14. Distribution of Book Citations by Publisher Categories for Environmental Sciences

Publisher Type	Citations	Citation Percentage
Commercial	387	37.7%
Government	272	26.5%
University Press	209	20.4%
Organization	85	8.3%
Society	41	4.0%
Other	16	1.6%
Academic	16	1.6%
Total	1,026	100%

Table 15. Environmental Sciences Book Publisher Ranking

Publisher	Citations	Citation Percentage
Cambridge University Press	61	5.9%
Wiley	56	5.5%
Taylor & Francis	45	4.4%
Elsevier	41	4.0%
Springer	36	3.5%
Pearson	24	2.3%
Oxford University Press	24	2.3%
McGraw-Hill	17	1.7%
Sage	7	0.7%
Columbia University Press	7	0.7%
Top 5 Publishers	239	23.3%
Top 10 Publishers	318	31.0%

Mathematics

Table 16 shows there were 767 books cited from103 mathematics dissertations included in this study. This represented the lowest number of books cited of all the subject areas at 7.45 books per dissertation. Commercial book publishers represented 68.7% of the book citations in this category, the third highest of the subject categories. University presses were responsible for 17.7% of book citations, and society presses were responsible for 11.1%.

Springer was the most frequently cited book publisher, with 20.9% of books cited (see table 17). Commercial publishers make up the top four publishers, with Oxford University Press as the fifth most cited. Top five and ten publishers are the most dominant of all the subject categories, with 79.9% and 97%, respectively.

Table 16. Distribution of Book Citations by Publisher Categories for Mathematics

Publisher Type	Citations	Citation Percentage
Commercial	527	68.7%
University Press	136	17.7%
Society	85	11.1%
Academic	11	1.4%
Other	4	0.5%
Government	2	0.3%
Organization	2	0.3%
Total	767	100%

Table 17. Mathematics Book Publisher Ranking

Publisher	Citations	Citation Percentage
Springer	179	20.9%
Wiley	165	14.5%
Elsevier	143	13.5%
Pearson	55	11.6%
Oxford University Press	71	2.4%
Taylor & Francis	48	2.0%
McGraw-Hill	31	1.9%
Princeton	11	1.7%
RR Donnelly	31	1.6%
MacMillan	10	1.6%
Top 5 Publishers	613	79.9%
Top 10 Publishers	744	97.0%

Physics

This case study included 129 dissertations from the physics category, which included 1,108 book citations—an average of 8.59 book citations per dissertation. Commercial publishers were responsible for 71% of book citations, and the university presses made up 23.7%. This only leaves 5.2% to other publisher categories (see table 18).

Top five and top ten publishers are responsible for 61.8% and 77.8%, respectively (see table 19). Three commercial publishers are in the top five ranking, with Springer accounting for 20.9% of book citations.

Table 18. Distribution of Book Citations by Publisher Categories for Physics

Publisher Type	Citation	Citation Percentage
Commercial	787	71.0%
University Press	263	23.7%
Society	26	2.3%
Organization	17	1.5%
Government	7	0.6%
Other	4	0.4%
Academic	4	0.4%
Total	1,108	100%

Table 19. Physics Book Publisher Ranking

Publisher	Citations	Citation Percentage
Springer	179	20.9%
Wiley	165	14.5%
Elsevier	143	13.5%
Cambridge University Press	127	11.6%
Oxford University Press	71	2.4%
Pearson	55	2.0%
Taylor & Francis	48	1.9%
McGraw-Hill	31	1.7%
RR Donnelly	31	1.6%
Kluwer	12	1.6%
Top 5 Publishers	685	61.8%
Top 10 Publishers	862	77.8%

Conclusions

The results and rankings clearly show the dominance of commercial book publishers, as evidenced by citations in science PhD dissertations. Though variations in distribution exist among the subject categories, books from commercial publishers dominate in aggregation and among the seven science subjects studied here. Combined commercial and university presses account for a majority of book citations (83%) in PhD dissertations.

The results are similar to and confirm the findings of Franks and Dotson's study of book citations at The Ohio State University. Franks and Dotson note in their case study, "A logical next step would be to use citation analysis of theses and dissertations to help provide data for making decisions about e-book acquisitions" (2017, 66). E-book acquisitions are an important consideration, however there may be broader implications. As Peter Givler (2002, 108), former director of the American Association of University Presses noted, university presses arose in response to the lack of a commercial market for scholarly publishing and from the understanding that

> costs were too high and markets too small to attract a publisher hoping for financial profit. To leave the publication of scholarly, highly specialized research to the workings of a commercial marketplace would be, in effect, to condemn it to languish unseen. If the aspiration of the university was to create new knowledge, the university would also have to assume the responsibility for disseminating it.

However, now that a strong profit motivation exists for commercial publishers, the responsibility is shifting away from universities, and the aspirations to create new knowledge have become subjugated by profit-seeking. Additionally, it has also created pressures on university presses to act more like commercial presses in order to survive.

Opportunities for universities and their libraries and university presses, in collaboration, exist in institutional repositories, open access initiatives, self-publishing/e-publishing models, and social media (Carpenter et al. 2011; Clement 2011; Hayes and Holley 2014). The dominance of commercial publishing shown in this study may be just one more justification for full-heartedly pursuing publishing initiatives beyond just focusing on ebook platforms and collection development.

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