A citation analysis examining geographical specificity in article titles

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# Abstract

This investigation explores the impact of geographical names within article titles on citation frequency across a corpus of literature within the field of library and information science, spanning from 2018 to 2020, and encompassing fifty-six journal titles. We hypothesized that the presence of geographical names of nations in article titles would negatively correlate with citation counts. Our primary analysis of 1330 articles with geographical names in titles versus 8702 without, revealed a statistically significant, albeit small, difference in median citations, favoring articles without geographical names (*mdn* = 7) over those with geographical names (*mdn* = 6). Contrary to our secondary hypothesis, a proximity analysis demonstrated a weak, positive correlation between the position of geographical names near the title end and citation counts. Our examination found little evidence supporting differential citation frequency based on the Human Development Index (HDI) of the nations mentioned in titles. However, although a journal’s impact score strongly predicted citation counts for articles, we found that these counts were depressed when articles in those journals contained a geographic name. We found a negative correlation between the frequency of geographical names in article titles and the journals’ impact scores, yet this was weakly, statistically significant. Our data also suggested a vague positional preference for nations within titles, unrelated to HDI. Furthermore, the likelihood of journals publishing articles mentioning nations of varying HDI was found to be statistically insignificant. This study sheds light on the nuanced influence of title specificity, through geographical names, on scholarly communication and citation impact, indicating a slight preference for broader title phrasing in garnering citations.

Keywords: Human Development Index, scholarly communication, scholarly writing, nation names, library and information science

# Introduction

A well-crafted article title informs and can serve to attract readers. Authors must write titles that succinctly capture the central theme of their paper. Since titles function within the knowledge creation process, titles reflect disciplinary identity and expectations (Milojević 2017). In some disciplines, like math, titles focus on succinctness. Yet in other areas, like the social sciences, titles stress informativeness. In the medical sciences, the use of questions in titles has increased substantially since the 1960s, showing also geographical trends, representing perhaps institutional pressures to publish faster (Ball 2009).

The necessity to promote academic papers, to express disciplinary identity, to provide information, and other factors leads to various naming conventions, such as using colons in titles, writing succinct titles, or writing compound titles. Naming conventions can be informative. Titles with colons (compound titles) are less succinct and potentially more informative. They move from making general statements (left of colon) to specific statements (right of colon). The specificity ranges from descriptive to declarative statements. Succinct titles may focus on providing topical information. Compound titles may add information about the method, research design, results, or conclusion of a study (Li and Xu 2019).

Title informativeness can be helpful when searching literature for a topic. The informativeness of a title can be a function of the words it contains and its length or word count. In the economics literature, longer titles receive more citations (“the informative effect”) than succinct titles (“the succinct effect”), but this is only true after the year 2000. Guo et al. (2018) attributes this to the rise of online searching, where retrieval technology based on relevance algorithms begins to replace keyword searching in various bibliographic fields. Li and Xu (2019) found that title length started to increase during this time frame, but defined title informativeness not solely based on word count but on the proportion of content words (e.g., nouns, verbs, adverbs) to function words (e.g., pronouns, prepositions, conjunctions). They posit that titles with a higher ratio of content words are more informative. This may be complicated if function words are overly specific, obscure, or non-normative in some way (Fox and Burns 2015; Thelwall 2017).

Writing informative titles is important because if a title poorly captures the information about the content of a paper, then papers may be overlooked by searchers even if the papers are relevant to them. Alternatively, if title information appears non-applicable, even if the paper is relevant to a searcher, then such papers may be overlooked. For example, papers with titles that ask questions have been shown to receive more downloads but fewer citations than papers with other title types (Jamali and Nikzad 2011; Paiva et al. 2012). This suggests that question-type title might generally be less informative. However, disciplinary effects exist. Papers with titles that ask questions are cited more in the computer science literature (Fiala et al. 2021), and no citation effects were found for question-type titles in an ecology journal (Fox and Burns 2015).

As mentioned, the use of compound titles has grown in recent decades, especially in some research areas or disciplines. Li and Xu (2019) outline three types of compound titles that capture specific semantic content. These are titles that describe the topic and the method or design, titles that describe the topic and the results, and titles that describe the topic and the conclusion of a study. Additionally, some authors add geographical names to compound titles, which may not add key semantic information about a paper’s topic (Kou et al. 2018). Studies have shown that papers with titles that contain certain types of highly specific or obscure content, like genus or species information (Fox and Burns 2015), or specific geographical place names, receive fewer citations (Abramo et al. 2016; Costello et al. 2019; Jacques and Sebire 2010; Moradi and Asnafi 2016; Paiva et al. 2012; Thelwall 2017). The common explanation is that this kind of taxonomic or geographic specificity is extraneous to the study, and that it reduces the generality and the appeal of the results (Fox and Burns 2015; Thelwall 2017). However, pointing to more disciplinary differences, specificity might be appreciated in some disciplines, like entomology, where titles with specific genus and species names or geographic names have been shown to have greater impact (Murphy et al. 2019).

Abramo et al. (2016) and others (Fox and Burns 2015; Thelwall 2017) have reasoned that overly specific terms or words in titles, especially those naming geographic entities, tend to receive fewer citations because searchers reviewing these titles do not find them relevant even if the topic is relevant. Abramo et al. (2016) suggested, for papers with geographical names in titles, that “studies conducted at the country level would typically be less appealing that [sic] those dealing with the same subjects at the broader level. The researcher [or potential reader] could suspect that certain results would be influenced by country-specific traits, and therefore be difficult to generalize” (p. 13). However, papers without specific geographical names in the titles might still be limited to specific geographical areas, and this raises questions about why authors decide to include geographical information in titles.

There is compelling evidence that the use of geographic names in article titles reveals potential biases in the representation of Western and non-Western populations in the CHI Conference Proceedings. Specifically, Kou et al. (2018) found that “studies conducted with non-Western populations are significantly more likely to highlight study contexts in titles and throughout the text,” and that “studies of Western countries are significantly more likely to lack mention of the studied countries not only in titles, but also throughout the text of the papers” (Kou et al. 2018, p. 2). Their findings revealed that when country names were added to titles, they were often added at the end of a title. To them this suggested weak “semantic connections between the preceding ideas in the titles and the countries” (p. 8). Overall, their study suggests a geographical bias in the CHI literature to normalize findings based on Western populations and to make exotic those findings based on non-Western populations.

Like Kou et al. (2018), our interest lies in examining the context in how authors use geographic names in titles. However, Kou et al. (2018) apply a simple binary classification of Western and non-Western countries based on work by Huntington (2011). Burns and Fox (2017) use the Human Development Index (HDI) (Nations 2023), a compound index that measures a nation’s level of health, education, and standard of living, in order to identify more nuanced geographic patterns. We follow Burns and Fox (2017) in using the HDI to ask the following questions for the current study:

RQ: Does the inclusion of geographical names in the titles of journal articles impact their citation counts, after accounting for the Human Development Index score for the named location?

In order to answer these questions, we propose the following hypotheses:

* Main Hypothesis: Journal articles with geographical names in their titles are cited less frequently than those without geographical names.
  + Sub-Hypothesis 1: The closer a geographical name is to the end of the title, the fewer the citations the article would receive.
  + Sub-Hypothesis 2: Articles that mention nations with a higher Human Development Index in their titles are cited more frequently than articles that mention names with a lower Human Development Index.
  + Sub-Hypothesis 3: The impact of geographical names in titles on citation counts is moderated by the impact of the journal.
  + Sub-Hypothesis 4: Journals with a high frequency of articles with geographical names in titles have a lower impact compared to journals with a low frequency of articles with geographic names in article titles.
  + Sub-Hypothesis 5: Nations with lower HDIs will more likely appear toward the end of article titles than nations with higher HDIs.
  + Sub-Hypothesis 6: Journals may be more or less likely to publish articles that mention nations with higher or lower HDIs.

# Materials and Methods

Our data is focused on articles published in library and information science (LIS) journals, as broadly categorized and listed by Scimago’s Scientific Journal Ranking (SJR) and the Scimago Journal and Country Rank (2021) data. We limited our set of articles to journals ranked in the first quartile (Q1) of the LIS category. We conducted Scopus queries for each journal in this list and downloaded bibliographic records for articles published in these journals from 2018 to 2020. We limited our data to the three year time period in order to align with the Scimago journal ranking time frame. Figure 1 reports an example *Scopus* query for the journal *International Journal of Information Management*:

SRCTITLE ( "International Journal of Information Management" ) AND (  
LIMIT-TO ( PUBYEAR , 2020 ) OR LIMIT-TO ( PUBYEAR , 2019 ) OR LIMIT-TO  
( PUBYEAR , 2018 ) ) AND ( LIMIT-TO ( DOCTYPE , "ar" ) )

*Fig. 1: Example Scopus query to retrieve bibliographic records from one journal.*

We focused on journals that published papers with a social science perspective and less on science and technical processing, as noted in Kim and Kim (2024). We therefore removed two chemistry journals (*Journal of Chemical Information and Modeling* and *Journal of Cheminformatics*) and two computer science journals (*IEEE Transactions on Information Theory* and *Journal of Classification*). Our analysis thus includes 10032 article records across the 56 journals.

The bibliographic records are in English, but some titles were written in other languages (e.g., Bosnian, Croatian, Portuguese, and Spanish). To reduce the duplication of titles, we used only the English translations of these titles if there was one.

We combined and imported the bibliographic records into R (R Core Team (version 4.4) 2024) using the *bibliometrix* package (Aria and Cuccurullo 2017). We used the R *spacyr* package, a wrapper for the Python natural language processing (NLP) library, to identify place names in article titles (Benoit and Matsuo 2023; Honnibal and Montani 2022). The code parsed titles line by line, and if it detected a geopolitical entity, such as a country, state, or city, it would store that entity as a token. If an article title mentioned a university, city, state, province, or like, we would use the nation of that place. For example, if an article title contained the name ‘Alaska’ and kept ‘alaska’ as the token, then we used ‘United States’ for the nation and HDI variables. Alternatively, if a title included a term like ‘american’, the *spacy* library was sometimes able to reference this as the *United States* or as ‘us’. Therefore, when titles included place name variations, or locales within nations, we referred to the canonical name for the nation referenced or inferred in the title.

We manually reviewed and revised the data after locating false positives or negatives. This resulted in 1330 (13.26%) article titles with place names. In total, we identified 46 false positives, where spaCy falsely labeled a title as containing a place name. Most false positives were singular, but three appeared more than once: **smart** (as in ‘smart city’) appeared 11 times, **lgbt** appeared four times, and **node** appeared twice. We identified 578 false negatives, where spaCy missed labeling a title as containing a place name. However, as noted in Kim and Kim (2024), place names can be polysemous. That is, this effect may be the result of place names having multiple meanings, such as describing a place versus describing a characteristic: e.g., ‘spanish cities’ versus ‘spanish language’. In the end, we removed place names in the false positives and added place names in the false negatives. In all, there was a total of 177 geographical areas or combinations of areas identified in the titles. Table 1 reports the most frequent nations mentioned or referred to in article titles.

Table 1. Twenty Most Frequent Geographical Political Areas Referred to in Article Titles for LIS Journals, 2018-2020

|  |  |
| --- | --- |
| GPE | n |
| china | 153 |
| spaina | 149 |
| us | 139 |
| uk | 72 |
| eu | 59 |
| india | 40 |
| nigeria | 36 |
| africa | 27 |
| south korea | 27 |
| brazil | 26 |
| south africa | 26 |
| australia | 24 |
| italy | 21 |
| pakistan | 16 |
| russia | 16 |
| canada | 15 |
| latin america | 15 |
| germany | 14 |
| mexico | 14 |
| turkey | 14 |

aSpain was mentioned in 119 article titles in the journal *Profesional de la Información.*

To answer our fifth sub-hypothesis, we counted the total number of characters in each title, and the total number of characters up to the first character of the identified token for the place name in the title. If a title had multiple place names, then we counted up to the character of the first place name. We calculated the proportion by dividing the count of the location of the first character of a place name out of the total characters in a title. Titles with place names near the beginning of a title contained scores closer to zero, whereas titles with place names near the end of a title contained scores closer to one.

We normalized place names based on country names used in the 2021-2022 Human Development Index (HDI) from the United Nations (UN) Development Programme. When analyzing the Human Development Index (HDI) of places mentioned in article titles, we made specific methodological decisions to handle various naming conventions and political entities. If a place was part of a broader collective (e.g., Scotland or Puerto Rico), we chose the HDI for the broader political authority (i.e., the United Kingdom or the United States, respectively). The HDI includes regional values (*n* = 109): when article titles referenced Africa, we used the HDI for ‘Sub-Saharan Africa’, or when article titles referenced Europe, we used the HDI for ‘Europe and Central Asia’. When multiple place names appeared in the title (*n* = 89), regardless if the place names were regional or country level, we averaged the HDI scores. Some articles had titles with nation names that do not have an HDI. These were marked as NA in the HDI variable.

The HDI summarizes three indices: a life expectancy index, an education index, and GINI index for measuring income inequality. These indexes are simplified to a composite score across four categories: very high (>= 0.8), high (>= 0.7), medium (>= 0.55), and low (<= 0.549). There were 1286 records with HDIs. The averaged HDI for titles that mention multiple locations was very high on the HDI scale (*m* = 0.866; *mdn* = 0.871), indicating that nations with very high HDIs collaborate with nations that also have very high HDIs. However, the overall average HDI scores indicate that most nations or places named in article titles are nations or places with very high HDI scores (*m* = 0.817; *mdn* = 0.858).

Finally, we added SCImago Journal Rank (SJR) scores for each of the 56 journal titles in the data set. We used the SJR to control for citation effects across articles. SJR scores ranged from 0.528 to 4.584 for the publication titles in the data. A SJR score below 1.0 indicates below average citations compared to all journals in *Scopus*. The mean SJR in the data was above average (*m* = 1.259), but the median was lower, indicating a skewed distribution of scores (*mdn* = 0.929). After de-duplicating publication titles and counting only unique journal titles, the average SJR in the data was lower (*m* = 1.123; *mdn* = 0.831), indicating publication titles with higher SJR scores appear more frequently in the data.

All code and data can be accessed on the first author’s GitHub: <https://github.com/cseanburns/geo-titles>

# Results

This research aimed to investigate the relationship between the presence of geographical names in journal articles and their citation counts. We tested several hypotheses to understand the nuances of this relationship. Overall, we found that there was a small citation effect on journal articles that contained place names in titles. Articles that contained place names received significantly but slightly fewer citations than articles without place names. We present the results below.

## Hypotheses and Analyses

**Main hypothesis:** We hypothesized that journal articles with geographical names in their titles (*n* = 1330) are cited less frequently than articles without geographical names (*n* = 8702). The Wilcoxon rank sum test revealed a statistically significant difference in citation distributions between articles with and without geographical names in their titles (*p* < 0). Further analysis showed a small citation effect. Articles with geographical names had a slightly lower average citation count (*mdn* = 6) than those without geographical names (*mdn* = 7).

**Sub-Hypothesis 1:** We hypothesized that the nearer a place name is to the end of the title, the fewer the citations the article would receive. We found some evidence in the data for the opposite relationship (Fig. 2). Specifically, we found a slight, positive correlation (Spearman *rho* = 0.049), indicating that the nearer a place name was to the end of a title, the more citations it received. However, the correlation was weakly significant (*p* < 0.078).

[INSERT FIGURE 2 HERE]

*Fig. 2:* There is a weak relationship between citations and position of

place names in titles.

**Sub-Hypothesis 2**: We found little evidence to support our hypothesis that articles mentioning nations with a higher Human Development Index in their titles were cited more frequently than articles mentioning nations with a lower Human Development Index. The correlation between the HDI of a nation named or inferred in a title was slightly negative and significantly weak (Spearman *rho* = -0.053; *p* = 0.059).

**Sub-Hypothesis 3**: We hypothesized that the impact of geographical names in titles on citation counts would be moderated by the impact of the journal. To test this hypothesis, we regressed the presence of place names in titles, the journals’ Scimago Journal Rank (SJR), and their interaction on citation counts. Overall, we found that the model explained a significant portion of the variance in citation counts (R2 = 0.1401, F(3, 10028) = 544.4, *p* < 0.001). Specifically, we found that the presence of a place name in the title has a significant negative effect on citation counts (*B* = -3.76, *p* = 0.002), which indicates that articles with such titles tend to receive fewer citations. Furthermore, our model shows that when holding constant the presence of a place name in article titles, the expected number of citations increases by 9.803 (*p* < 0.001) for every unit increase in the SJR. However, citation counts seem to be significantly reduced by the interaction between the presence of a place name in a title and the impact of the journal. Here we find that for each unit increase in a journal’s SJR, the effect of place name in an article’s title on citation counts increased only by *B* = 1.963 (*p* = 0.027).

Table 2. Coefficient Estimates for Model Estimating the Interaction between the Presence of a Place Name in a Title and a Journal’s SJR

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Predictor | B | SE | t | p |
| Intercept | 1.50 | 0.418 | 3.59 | <0.001 |
| Title Has Country | -3.76 | 1.224 | -3.07 | 0.002 |
| SJR | 9.80 | 0.260 | 37.69 | <0.001 |
| Interaction | 1.96 | 0.885 | 2.22 | 0.027 |

**Sub-Hypothesis 4:** We hypothesized that journals that publish a high frequency of articles with geographical names in titles are journals that have lower impact scores. We found some evidence that journals that publish more articles with place names are less likely to have higher SJR scores. However, our data indicated a weak, negative correlation between the frequency with which a journal publishes articles with place names in titles and the journal’s impact score (Spearman *rho* = -0.23; *p* = 0.088) (Fig. 3).

[INSERT FIGURE 3 HERE]

*Fig. 3:* There is a statistically weak relationship between the frequency of articles with place names in titles in journals and the journals' impact score.

**Sub-Hypothesis 5:** We hypothesized that there would be a relationship between the position of a place name in the title and the HDI of the nation named: specifically, that nations with lower HDIs will more likely appear toward the end of article titles. We found that nations appear more often in different positions in the article titles, but we could not find an explanation of this relationship from our data (Fig. 4). Specifically, we found a weak, negative correlation between the average position of a named place in a title and the HDI of the named place (Spearman *rho* = 0.018; *p* = 0.94). Although our data suggests that different nations appear in different average positions in titles, this does not appear to be due to the nation’s HDI score.

[INSERT FIGURE 4 HERE]

*Fig. 4:* The relationship between average location of nations named in article titles and HDIs. Only nations appearing in at least ten articles are displayed (n = 21).

**Sub-Hypothesis 6:** We hypothesized that journals may be more or less likely to publish articles that mention nations with higher or lower HDIs. We found no evidence to suggest a relationship between the frequency that journal titles publish articles that mention place names and the HDIs of the named nations (Spearman *rho* = 0.034; *p* = 0.812) (Fig. 5).

[INSERT FIGURE 5 HERE]

*Fig. 5:* We found no statistically significant relationship between SJR and HDI of nations mentioned in article titles.

# Discussion

Based on the results of other studies that have found that titles that were overly specific about certain factors were cited less (Fox and Burns 2015; Thelwall 2017), we developed a hypothesis that journal articles with geographical names in their titles would be cited less frequently than those without geographical names (Abramo et al. 2016; Costello et al. 2019; Jacques and Sebire 2010; Moradi and Asnafi 2016; Paiva et al. 2012; Thelwall 2017). Like Kou et al. (2018), we found evidence to support this hypothesis that there is a preference for generality in article titles; however, although the difference was statistically significant, the effect size was minimal.

Most interestingly, we hypothesized that the impact of geographical names in titles on citation counts is moderated by the impact of the journal (Sub-Hypothesis 3). Here we found stronger evidence that the impact of a journal, as measured by its SJR, is a strong predictor of an article’s citation counts, but citation counts are depressed with the presence of a place name in an article title despite the overall impact of a journal.

Although papers that reference country names in titles received fewer citations, we could find no relationship between the development level of a named country with the number of citations. We could also find no strong relationship between the location of the country name in the title with the article’s citations. Consequently, although our data does not show geographical bias against any specific country, it does show a general preference for titles that lack geographic specificity.

Further research might explore other potential factors that influence citations to articles with place names. These factors may include the specific content of the articles, the information presented in the abstracts, the disciplines of the journals, broader cultural or academic trends, or the language or the coauthorship characteristics of the articles. Also, the small citation difference observed in the main hypothesis may be the result that papers with place names in their titles are read and cited heavily by regional author networks (Chinchilla-Rodríguez et al. 2014). That is, if further studies examine the citation networks of articles that include place names, we hypothesize that there is a substantial within-nation network citation advantage to including place names in articles, especially if geographical context plays an important role in a study (Murphy et al. 2019). For example, article titles that include geographical names might tend to attract citations from others in the named regions. Such localized citations could be a reflection of the article's relevance to that particular context, and future studies could examine the variance in how geographical names are reflected in titles between local/regional journals and international journals. While including a geographical name might lead to a potentially narrower focus and appear less applicable to a broader audience, this might be offset by the importance of a study within a region. Future studies of regional author networks could provide insights into the dynamics of regional academic engagement and the impact of local relevance on scholarly communication.

## Limitations

The spaCy library was useful in identifying geopolitical entities in the data, but we found that the default configuration fails to capture the subtle ways that places are referred to in article titles. This could be rectified with additional training beyond the defaults (“Training Pipelines & Models · spaCy Usage Documentation” n.d.).

It could be that citation differences between article titles with place names and without place names are more pronounced when sampling from lower impact journals or when sampling journals in other disciplines. Here, we only considered LIS journals. A future study with journals from other disciplines can add evidence to support the present results. The results could be different with a longer citation window. We also did not control for other factors, such as if a title contains a colon, a question, or humor.

Finally, it’s important that we note that our analysis is based on observational data. As such, causal interpretations should be made with caution.

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