Difference in Citation Rates by Subject Areas of LIS in Korea

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ABSTRACT
Citation analysis, in addition to peer review, is one of the popular methods to assess faculty research performance. In some disciplines, the validity of citation counts for evaluating research has been proven by many studies. However, it should be used cautiously when different disciplines are concerned, because citation practices may vary across disciplines. Although there have been studies that have examined the different citation practices across disciplines, relatively little research has investigated the citation rates of subject areas within a single discipline. This study explores the citation rates of subject areas in library and information science (LIS) in Korea. The preliminary results of this study will provide the rationale for further work, analyzing the causes of different citation patterns in a discipline. Ultimately, the study could provide useful implications for understanding and using the citation counts in assessing research performance.

Keywords
Citation count, library and information science, LIS, subject area

INTRODUCTION
Two major methods for evaluating faculty research are peer review and bibliometric indicators. Although peer review is a common method in research assessments (Brinn, Jones, & Pendlebury, 2000), some weaknesses of peer review, such as prejudice, inconsistency and high cost, have presented the need for numeric indicators based on bibliometric methods (De Bellis, 2009). The simplest way to quantify research outcomes in bibliometrics is by counting the number of publications. Further, citation indicators derived from citation analysis of journal articles (e.g., impact factor, h-index, g-index) have been widely used to assess the quality and impact of research work. In certain academic disciplines including information science, the validity of citation counts in research assessments has been proven by some studies, demonstrating significant positive correlations between the citations and expert ratings (Cronin, 2005). However, citation studies acknowledge the limitations of using citation counts to assess the research performance across disciplines due to different disciplinary cultures (Cronin, 2005).

Although some studies have examined different citation behaviors across disciplines (Brooks, 1985; Radicchi, Fortunato, & Castellano, 2008), relatively little research has investigated the citation rates of subject areas within a single discipline. Since sub-disciplines within a discipline could have different characteristics in their popularity or sizes of communities, the citation patterns may vary. In particular, library and information science (LIS), known as an interdisciplinary field, may present different citation patterns among the sub-fields. To address this dearth of research, this study explores the citation rates of subject areas in library and information science (LIS) in Korea. The preliminary results of this study will provide the rationale for further work, analyzing the causes of different citation patterns in a single discipline. Ultimately, the study could provide useful implications for understanding and using the citation counts in assessing research performance.

It asks the following research questions:
1. Which subject areas of LIS were popular (i.e., publication count) and influential (i.e., citation count) in Korea for the past 10 years?
2. Is there any difference in the citation rates of articles among subject areas?

LITERATURE REVIEW
Many previous studies have attempted to explain the motivational factors of citing behaviors using three perspectives (Judge, Cable, Colbert, & Rynes, 2007; Peng & Zhu, 2012). The first of these, called “normative theory,” suggests that the quality and originality of a work are the determinants of citations. On the other hand, the second perspective, called “social constructivist approach,” critiques the assumption of the normative theory, arguing that extrinsic factors (i.e., author-, article-, or journal-level

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attributes) influence citing behaviors. The third perspective, “time-dependent effect,” claims that citation rates are related to the publication time.

Other studies have reported the different citation practices across disciplines. Brooks (1985) examined citing motivations by interviewing 26 faculty members from various disciplines. This research showed that faculty members cite other papers to persuade their arguments to others. However, there were differences in motivations between faculty from humanities and sciences. For example, while researchers in humanities prefer to cite papers for the purpose of persuasion, scientists tend to cite in order to demonstrate their currency. Vieira and Gomes (2010) presented the different citation rates of four scientific disciplines (i.e., biology & biochemistry, chemistry, mathematics, and physics): while the average citations of articles published in 2004 in biology & biochemistry was 13.59, mathematics papers only received 3.22 citations. In response to these studies, some researchers proposed a method of normalizing citations in order to compare them across disciplines. For instance, Radicchi, Fortunato, and Castellano (2008) attempted to normalize citations by considering the average citation counts of articles in a discipline.

METHOD
Content analysis was used to code the subjects of publications of Korean library and information science (KLIS) faculty. The authors analyzed the titles of journal articles to assign the subjects to them. After that, statistics were applied to see the difference in citation rates by subject areas.

Study Data
The study analyzed the publication data of KLIS faculty used in Yang and Lee’s (2010) study. To update the data, the list of tenure-track faculty members was collected as of May 2013. The number of faculty members has increased to 165, compared to 159 in Yang and Lee’s (2012) study; 17 new faculty were hired and 11 faculty retired. The publication list of new faculty members was compiled by searching the Korea Citation Index (KCI) managed by the National Research Foundation (NRF) of Korea. After collecting all the publication data, citation data were collected using KCI and NAVER search engines. A total of 4,350 citations to 1,992 journal articles (unique titles) published between 2001 and 2010 was collected. The data scope of this study is 1,986 articles and 4,350 citations after excluding four non-LIS articles and two unsearchable papers.

Coding Scheme
The authors, who come from Korea and have backgrounds in LIS, coded subjects of 1,986 journal articles using Park and Song’s (2013) classification scheme. This scheme was developed by Oh’s (2005) study, synthesizing various schemes proposed by international and Korean researchers. This classification has 10 key subject areas, which are: (1) foundations of LIS (e.g., history, research methods, librarianship), (2) library building & facilities, (3) library structure (e.g., library/information policy, collaboration, sharing), (4) management and administration (e.g., planning, personnel, collection development), (5) library & information services (e.g., types of libraries, reading and information literacy, service evaluation), (6) information organization (e.g., classification, cataloging, representation), (7) information science (e.g., bibliometrics, information system and retrieval, user studies) (8) bibliographic studies (e.g., old and rare books), (9) publishing (e.g., print and digital publishing), (10) record management (e.g., management of government material).

The authors coded the subjects independently by analyzing the titles. The inter-rater reliability was Kappa = 0.813 with p < .001, achieving the “almost perfectly agreed” reliability based on the rules of thumb suggested by Landis and Koch (1977). Disagreements in the classification were resolved through a discussion, and the reconciled result was used for the data analysis.

FINDINGS
Descriptive Statistics
As summarized in Table 1, Korean LIS faculty published 548 papers about information science (27.6%), followed by 284 bibliographic studies (14.3%), 273 library services (13.8%), and 258 information organization (13.0%) papers, etc. The overall mean citation rate of the papers, calculated by averaging the total number of citations by the number of publications, was 2.19 (SD = 2.57). The top three subject areas in terms of average citation counts were publishing (M = 3.0, SD = 2.00), foundations of LIS (M = 2.70, SD = 3.18), and library & information services (M = 2.47, SD = 3.18).

<table>
<thead>
<tr>
<th>Subject area</th>
<th>Num. of paper</th>
<th>Num. of citation</th>
<th>Avg. cite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Publishing</td>
<td>3</td>
<td>9</td>
<td>3.00</td>
</tr>
<tr>
<td>Foundations of LIS</td>
<td>208</td>
<td>562</td>
<td>2.70</td>
</tr>
<tr>
<td>Library &amp; Information Service</td>
<td>273</td>
<td>673</td>
<td>2.47</td>
</tr>
<tr>
<td>Management/ Administration</td>
<td>232</td>
<td>566</td>
<td>2.44</td>
</tr>
<tr>
<td>Information Science</td>
<td>548</td>
<td>1306</td>
<td>2.38</td>
</tr>
<tr>
<td>Library Building &amp; Facilities</td>
<td>27</td>
<td>61</td>
<td>2.26</td>
</tr>
<tr>
<td>Library Structure</td>
<td>72</td>
<td>159</td>
<td>2.21</td>
</tr>
<tr>
<td>Record Management</td>
<td>81</td>
<td>159</td>
<td>1.96</td>
</tr>
<tr>
<td>Information Organization</td>
<td>258</td>
<td>472</td>
<td>1.83</td>
</tr>
<tr>
<td>Bibliographic Studies</td>
<td>284</td>
<td>383</td>
<td>1.35</td>
</tr>
</tbody>
</table>

Table 1. Publication and citation counts by subject areas of KLIS
Differentials among Subject Areas
The study conducted an analysis of variance (ANOVA) to examine the differences in citation counts between subject areas. Before conducting this analysis, the authors excluded three articles classified into the subject of publishing because of the small sample size (N = 3) compared to other areas (see Table 1). The result of the ANOVA test presented the statistically significant differences in citation counts among subject areas, F (8, 1978) = 6.724, P < .001. Post-hoc Tukey's HSD test suggested that papers about bibliographic studies were significantly less cited than those addressing foundations of LIS, management and administration, information services, or information science at the .01 level of significance. Moreover, papers about information organization were significantly less cited than the papers related to foundations of LIS at the .01 level of significance.

DISCUSSION
This study, although limited to LIS research in Korea, presents the different citation rates of subject areas in a single discipline. LIS is an interdisciplinary field (Saracevic, 1999), consisting of researchers coming from diverse backgrounds or research areas such as computer science, linguistics, philosophy, or sociology. This may imply the limitations of assessing LIS researchers using citation counts, as it is difficult to compare the impact of engineering researchers with sociology researchers using a simple citation indicator. Even within a single subject area, the citation rate of an article may be influenced by social or political trends. Nevertheless, we cannot ignore the assumption of normative theory on citation counts, considering many studies that prove the validity of citation analysis. For this reason, we were unable to conclude that such differences in citation counts are caused by only the quality of work or only external factors such as the number of references, audience size, or self-citations. More complex analysis should be done to better understand this phenomenon.

LIMITATION AND FUTURE WORK
Since this study relies on the publication and citation data of Korean LIS scholars, the findings cannot be generalized into LIS studies in other countries. In addition, using different coding schemes could produce a different result. For instance, the ALISE research area classification scheme has separate classes of “LIS education,” “informatics,” and “school libraries,” while the scheme used in our study places such classes into “foundation of LIS,” “information science,” and “information service” respectively. Also, the classification scheme designed by Jarvelin and Vakkari (1990) has the separate classes of “professions in the field of library and information science,” “library history,” “education in LIS,” and “methodology” that can fall into a class of “foundation of LIS” in our study.

In future studies, we will explore the causes of citation differentials among LIS subject areas by contextualizing it. In particular, we will analyze citing authors and articles to see the effect of the size of audience and self-citations. The growth of iSchool movement or data-driven accountability in higher education can also be used to explain the citation differences. By doing so, some influence of the social constructivist approach on citing practice may be examined. In the long run, it would be interesting to apply this study method to a large data set, such as citation data of LIS in the United States.

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