

# Bibliometric Analysis of the Changes of Korean LIS Journals' States with Journal Coupling Analysis

저널 결합 분석을 이용한 한국 문헌정보학 저널의 입지 변화에 대한 계량서지적 분석

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## ABSTRACT

This study examined two characteristics of library and information science (LIS) journals in Korea through analysis of journal coupling with common authors. This study also illustrated the trend of Korean LIS research in the recent decade. The notable change is that record management and archival studies settle in LIS domain as a major research area. We introduced two indicators, Publishing Preference Index (PPI) and Researcher Attraction Index (RAI), based on the degree of common authors among journals. Both indicators revealed notable changes in author coupling, including reversal of PPIs in some journals, which can be interpreted as proof of changes in their author groups. The RAI analysis, which measured the degree of journals' attractiveness to Korean LIS researchers and author sharing between two journals, illustrated the journals' states in a domain; this result can help find both an isolated journal and strongly bonded journals in the specific domain. Journal coupling with common authors introduced in this study proved to be an effective investigative method for illustrating journals' states in a specified domain as well as a multidisciplinary area.

## 초 록

이 연구에서는 학술지 사이에 저자 집단의 중복 정도를 측정하는 저널 결합 분석을 통해 한국 문헌정보학 학술지의 두 가지 특성을 조사하였다. 이를 통해 최근 10년 동안 국내 문헌정보학 연구의 경향을 설명했다. 가장 두드러진 추세는 기록관리학 분야가 주요 연구 분야로서 문헌정보학 영역에 정착했다는 점이다. 학술지 간의 저자 결합 정도를 이용해서 투고 선호 지수 PPI (Publishing Preference Index)와 연구자 유인 지수 RAI (Researcher Attraction Index)의 두 가지 지표를 제안하였다. 분석 기간 동안 두 지수 모두 상당한 변화가 있었는데 특히 PPI 순위의 역전은 학술지 투고 저자 집단이 변화했다는 증거로 해석될 수 있다. RAI 지수 분석은 한국 문헌정보학 연구자들의 투고를 유인하는 각 학술지의 매력도를 측정하고 두 학술지 사이의 저자 공유 수준을 측정함으로써 학문분야 내에서 특정 학술지의 입지를 보여주었다. 이를 통해 학문분야 내에서 비교적 독립적인 학술지를 찾거나, 강력하게 서로 결합한 학술지를 찾을 수 있었다. 이 연구에서 제시한 저널 결합 분석은 특정 분야나 학제적인 분야 학술지의 특성을 보여주는 효과적인 분석 방법이라고 판단된다.

Keywords: bibliometrics, library and information science, scholarly journals, journal coupling, Publishing Preference Index (PPI), Researcher Attraction Index (RAI)  
계량서지학, 문헌정보학, 학술지, 저널 결합, 투고 선호 지수 (PPI), 연구자 유인 지수 (RAI)

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## 1. Introduction

Paper topics are commonly used as a data set to identify the characteristics of academic journals. It is generally assumed that the topics of papers present the current states as well as the changes in an academic journal. Content analysis and bibliometric analysis of journals are common approaches to discover journals' states and their domain's state (Järvelin & Vakkari, 1993; Norelli & Harper, 2013; Seo & Yu, 2013). There are also several attempts to analyze journals of library & information science with diverse bibliometric methods such as topic modeling (Jin & Song, 2016; Lee, Jung, & Song, 2015; Park & Song, 2013), descriptor profiling (Kim, 2015a, 2015b), co-author network (Lee, 2016; Lee & Woo, 2015; Sohn & Nam, 2016), document co-citation analysis (Lee, 2015), journal inter-citations (Kim, 2015), and co-word analysis (Choi & Chung, 2016).

Article authors are also an important feature for identification of a journal's characteristics. Several studies have identified scholarly journals' states by using author analysis (Harter & Hooten, 1992; He & Spink, 2002; Ni, Sugimoto, & Jiang, 2013; Uzun, 2004); however, the relationships of author groups to journals have not been fully explored.

Authors usually consider two aspects to choose scholarly journals in which to publish. The first aspect is topic coverage. This means that if an author's work appears frequently in two different journals, they are closely related by research area. Conversely, if two journals have no overlapping authors, it means

that they are not in the same research area. The second aspect is authors' academic community; for example, society members tend to submit papers to that society's journal. These aspects indicate that author identification is an important way to identify the characteristics of journals.

This study examines the characteristics of library and information science (LIS) journals in Korea and discovers changes in these journals' states through the analysis of common authors among them. A Korean LIS journal is defined as a journal published by a Korean academic society that is classified as 'Library and Information Science' by the Korean Research Foundation (KRF).

The concept of journal coupling is derived from bibliographic coupling, which is a common method for analyzing the relationships among scholarly papers. We used authors instead of references to discover relationships among scholarly journals. In bibliographic coupling, the more than two papers share the same references, the closer they are topically. In journal coupling, the number of shared authors among journals can be used to measure their relationships. We used two indicators that are based on journal coupling: Publishing Preference Index (PPI) and Researcher Attraction Index (RAI). These two indicators show the states and relationships of journals within a common domain. PPI is used for identifying a journal's state by authors' preference in publishing their papers; RAI is designed to measure the relationship between two journals.

## 2. Scholarly Journals in Korea

To provide context for our analysis of changes in Korean LIS journals, here we briefly review the history of Korean LIS. In Korea, education in library and information science (LIS) at the university level began in 1957 when Peabody College of Education teams from the US provided assistance with postwar rehabilitation by helping to open Korea's first undergraduate and graduate courses at Yonsei University in Seoul. Several other major universities established departments of LIS in a process that continued until the mid-1980s. As the number of library departments increased, the number of LIS doctorates who obtained their PhDs from Korean universities also grew. In addition, many LIS professionals educated in the US and Europe returned to Korea and published their research. Due to this growth of the LIS research community in Korea, LIS research output made rapid progress both quantity and quality. Ultimately, several groups of LIS scholars began to publish academic journals. The first academic journal in Korea, *Library Science*,

was founded in 1970.

Today, LIS research is the subject of eight academic journals (Table 1). Of these, *Journal of the Korean Society for Information Management* (IM), *Journal of the Korean Library and Information Science Society* (KL), *Journal of the Korean Society for Library and Information Science* (KS) and *Journal of the Korean Biblia Society for Library and Information Science* (KB), all published quarterly, cover a wide range of LIS topics in the Korean LIS field. Most major Korean LIS researchers have published their papers in these journals more than once; KL and KB have specific contributor groups.

The *Journal of Information Science, Theory, and Practice* (IS) is published by KISTI, the major institute for technological and industrial information management and distribution in Korea. Due to the publisher's characteristics, the author range of this journal has expanded to include information professionals in the information institutes and industry. As a journal of a subfield in LIS, *Journal of the Institute of Bibliography* (IB) has the most specific author group and the narrowest topic coverage.

<Table 1> LIS journals in Korea investigated in this study

Journal Title	Journal Abbr.
<i>The Korean Journal of Archival Studies</i>	AS
<i>Journal of the Institute of Bibliography</i>	IB
<i>Journal of the Korean Society for Information Management</i>	IM
<i>Journal of Information Science, Theory, and Practice</i>	IS
<i>Journal of the Korean Biblia Society for Library and Information Science</i>	KB
<i>Journal of the Korean Library and Information Science Society</i>	KL
<i>Journal of the Korean Society for Library and Information Science</i>	KS
<i>Journal of Records Management &amp; Archives Society of Korea</i>	RM

Archival studies is a relatively new research area in Korea; the concepts of archivist and archives were not introduced to Korean researchers until the late 1990s. The Korean Society of Archival Studies and the Korean Society of Records Management and Archives were initiated in 2000.

In response to these recently established journals of archival studies, the boundary of Korean LIS research has been expanded. Consequently, it is necessary to review the current states of Korean LIS journals. This study illustrates the changes of journals with journal coupling analysis.

### 3. Data and Methodology

All data for this study were collected from the KCI database. KCI, a Korean citation index database provided by the Korea Research Foundation, currently indexes eight LIS journals. The latest journal to be included is *Journal of Records Management & Archives Society of Korea* (RM); it has been in-

dexed by KCI since 2006. Therefore, in order to review all LIS journals, our analysis is based citation data from 2006 to 2014. The total number of papers to investigate is 3,349 and the total number of authors is 5,392. Our analysis begins with a diachronic profile publications in Korean LIS journals, including numbers of papers and authors.

Table 2 provides statistics about papers published in Korean LIS journals over these nine years (2006-2014) and Table 3 shows author changes for each journal. A drastic increase of papers in KB began in 2009, due to the increase of its publication frequency (from biannual to quarterly).

To examine the changes in Korean LIS journals, we investigated trends in author groups of the eight journals using the journal coupling method, which is a variation of the bibliographic coupling method. Journal coupling measures the relationship between journals in the same way that numbers of shared authors are measured by bibliographic coupling (both methods count papers that have shared references).

〈Table 2〉 Paper statistics of Korean LIS journals, 2006-2014

Journal	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
AS	18	15	15	26	24	23	21	29	30	201
IB	33	34	34	45	38	41	42	46	56	369
IM	61	62	60	67	60	61	57	55	50	533
IS	31	33	41	33	37	44	38	24	15	296
KB	30	22	20	59	53	68	67	58	58	435
KL	75	89	88	86	65	71	75	75	71	695
KS	75	70	77	67	68	71	57	73	75	633
RM	7	16	20	20	18	24	28	29	25	187
Total per year	330	341	355	403	363	403	385	389	380	3,349

〈Table 3〉 Author statistics of Korean of LIS journals, 2006-2014

Journal	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
AS	19	15	19	32	36	28	36	41	47	273
IB	38	39	38	52	44	47	46	47	74	425
IM	111	116	103	129	97	100	95	109	87	947
IS	61	70	81	85	87	86	86	40	25	621
KB	42	33	39	101	95	100	105	100	105	720
KL	110	115	139	129	93	103	104	104	119	1016
KS	105	109	135	133	94	120	92	139	131	1058
RM	8	28	36	37	28	34	46	56	59	332
Total by year	494	525	590	698	574	618	610	636	647	5,392

We also adapted the concept of a three-year moving window. This concept is similar to a moving average, which is simply the average of a series of numbers over a period of time; these averages are constantly updated by dropping the oldest value, adding the newest value, and recalculating the average (Frandsen & Nicolaisen, 2008, p. 1573). Moving window and moving average prevent temporal outliers from directly affecting analysis and enable the illustration of certain trends. In the present study, the three-year moving window, which begins in 2008, reveals the total number of authors who published at least three papers in three years, starting in 2006 (Table 4).

Along with our statistical analysis of the eight LIS journals, we examined the characteristics of each journal with two indicators, Publishing Preference Index (PPI) and Researcher Attraction Index (RAI). PPI was utilized to measure the authors' journal preference to publish their works; the index calculates the intensity of the author community per journal. If a journal has a high PPI, it means that its topics are comparatively narrow because it has specialized author group. Characteristics of the author community also affect a journal's PPI.

The PPI of a journal is an average of individual authors' PPI for that journal. The PPI of author A to journal J can be calculated as follows:

〈Table 4〉 Number of authors who published more than 3 papers - three-year moving window, 2008-2014<sup>1)</sup>

Year	2008	2009	2010	2011	2012	2013	2014
Number of authors who published more than 3 papers	180	201	196	203	183	195	192

1) The number in the 2008 column includes papers published in 2006 and 2007; the number in the 2009 column includes papers published in 2007 and 2008; and so forth.

$$\begin{aligned} & \text{Author } A\text{'s PPI to journal } J \\ &= \frac{\text{Sum of } A\text{'s papers in Journal } J}{\text{Total number of } A\text{'s papers}} \end{aligned}$$

$$\begin{aligned} & \text{Journal } J\text{'s PPI} \\ &= \frac{\text{Sum of each author's PPI to journal } J}{\text{Total number of authors in journal } J} \end{aligned}$$

The RAI (Researcher Attraction Index) was utilized to measure asymmetric relationships of journal J to journal K by investigating overlapping authors between the two journals. The index compiles the number of journal J's papers submitted by authors of journal K. If the RAI of journal J to other journals is low, it means that journal J attracts authors of a specific and concentrated research area, and that the topic scope of journal J is comparatively narrow. Changes in an author community can also be detected by RAI. We analyzed changes of a journal's RAI in comparison to changes in other journals. If the RAI of journal J to journal K decreases over years, it means that the authors of journal J are moving away from the author community of journal K.

The RAI of journal J to journal K is authors' PPI average to journal J; for PPI calculation, authors must appear in journal K at least once. If the RAI of two journals is 0, it means that no author has been published in both journals. Conversely, if the RAI of journal J to journal K is high, journal K's authors prefer to publish their papers in journal J.

Journal J's RAI to journal K can be calculated as follows:

$$\begin{aligned} & \text{Journal } J\text{'s RAI to journal } K \\ &= \frac{\text{Sum of journal } K\text{ author's PPI to journal } J}{\text{the number of journal } K\text{ authors}} \end{aligned}$$

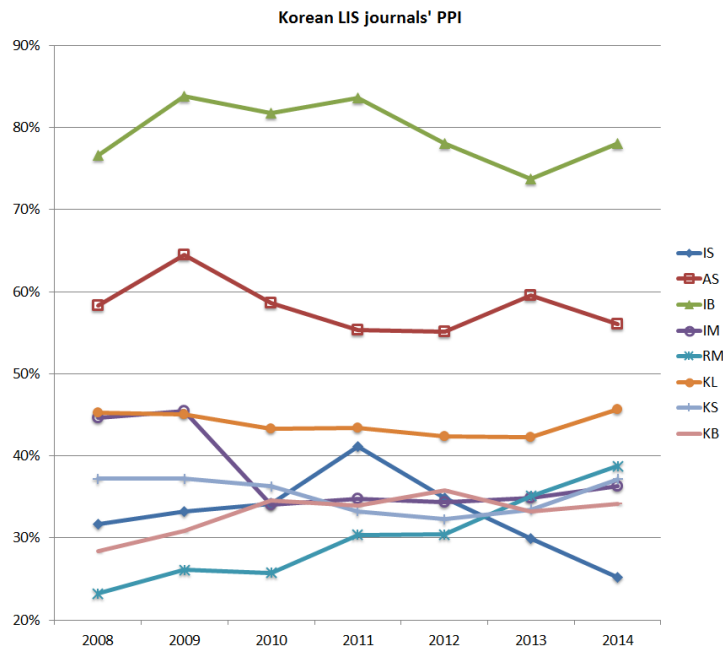
## 4. Results

### 4.1 Analysis of journals' states by PPI

Among Korean LIS journals, IB showed the highest PPI, followed by AS. High PPI of a journal means that the portion of authors who submit their papers exclusively to this journal is deemed to be large. Using PPI as an indicator, we found at least two isolated author groups in the Korean LIS field. The author group of IB consists of researchers in traditional Korean bibliography (a specific subfield of Korean LIS research). Their research interests are comparatively narrow and they haven't published except in KB. Because AS's author group displayed a similar publishing tendency, we concluded that AS also has isolated contributors who are only interested in archival studies. AS and IB seem to be concentrated with a specific research area of LIS, which leads to their high PPI.

On the contrary, RM, which has similar research topics to AS, shows different publishing preferences. RM's PPI was the lowest in 2008 even though, like AS, its subject domain is archival studies. The PPI for RM started at the lowest level but increased gradually to the fourth position in 2014. This increase means that in the earliest days of the journal, many authors who had published in other journals submitted their papers to RM; then, year by year, the group of authors who published only in RM (i.e., the exclusive author group for RM) grew larger.

The PPI for IS develops in the opposite direction.



<Figure 1> Analysis of journals' states by PPI, 2008-2014

In 2012, IS had an average PPI for the eight journals, but its PPI dropped to the bottom in 2014. The drastic change of IS's PPI can be interpreted as changes in its author group.

No notable changes in PPI were seen for KL, KS, KB and IM over the years. This may be because these journals deal with a wide range of LIS topics and therefore attract many researchers in the Korean LIS domain. As a result, their author groups seem to maintain steady trajectories. KL, which has the highest PPI among these journals, was originated by researchers in a particular geographic region (the southern provinces of Korea); we may assume that its author groups are therefore comparatively small, despite of the generality of its topic coverage.

#### 4.2 Analysis of journals' states by RAI

Figure 2~9 show the RAI trends of eight journals. The changes of each journal's RAI, compared to changes in other journals, show changes in terms of sharing authors. The increase or decrease of RAI indicates the convergence or divergence of these journals based on common authors.

AS has the low RAI with other journals except IB. The low RAI with most of other journals is interpreted as the author group of AS is not overlapped with others'. PPI of AS in <figure 1> also shows AS has the most loyal authors like RAI analysis (figure 2).

Among the eight journals, IB shows a trend of becoming more isolated over the years (figure 3). This means that IB authors tend to submit their papers

to other journals less and less. As a result, IB has a comparatively exclusive author group. In particular, IM and IB never shared authors even though they are classified as belonging to the same discipline (figure 3 and 4).

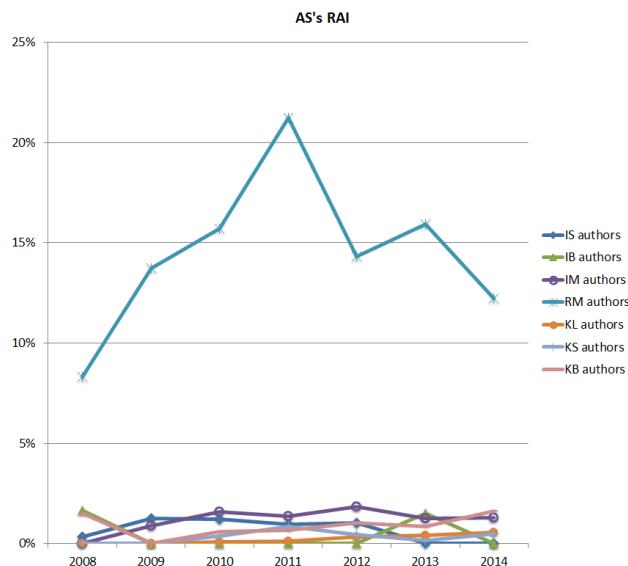
RAI of IS also decreased drastically like IB (figure 5). Since 2013, IS has published articles only in English. It caused the decrease of Korean authors and the increase of international authors. As a result, the number of shared authors with other Korean journals decreased and RAI shows the change of IS's state.

In contrast to IB & IS, the author group of KB becomes larger and larger (figure 6). According to KB's RAI trajectory, it has attracted more authors from other journals. In 2008, no journal has over 10% RAI with KB, but in 2014 RAI of 5 journals with KB became over 12%. It means KB becomes

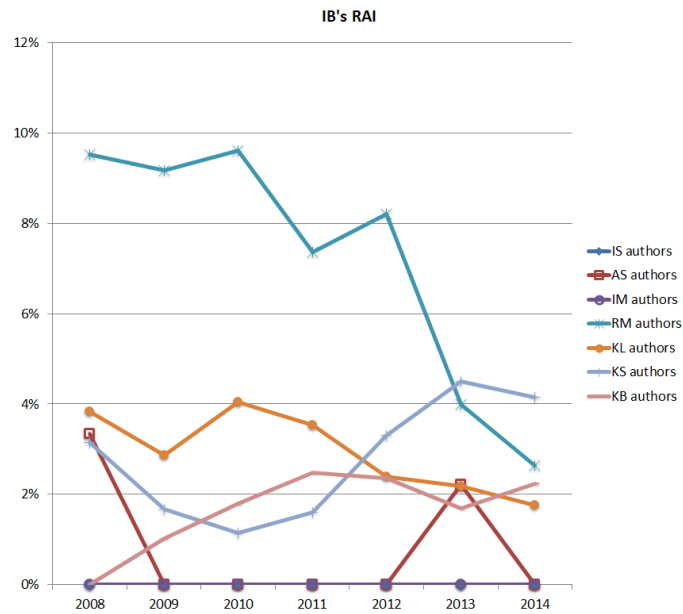
one of major journals that researchers consider to publish their articles in library and information science in Korea.

In general, RAI of KS and KL with other journals are relatively high. Most of them are about 20%. It can be interpreted as these journals attract authors with various interests (figure 7 & 8). Especially, KL shows the highest RAI. It means the authors of other journals also choose KL as a major journal to publish their papers. KL is the oldest journal in library and information science in Korea, so most of authors have published their papers in KL once or more.

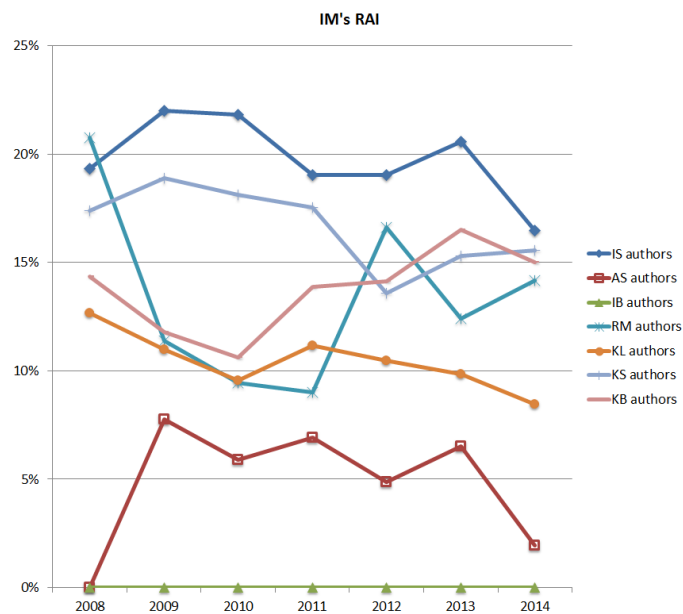
RM showed changing relationships with two other journals: at first it was closer to IB, but it moved closer to AS (figure 9). This change means that RM started publishing their papers in AS rather than IB.



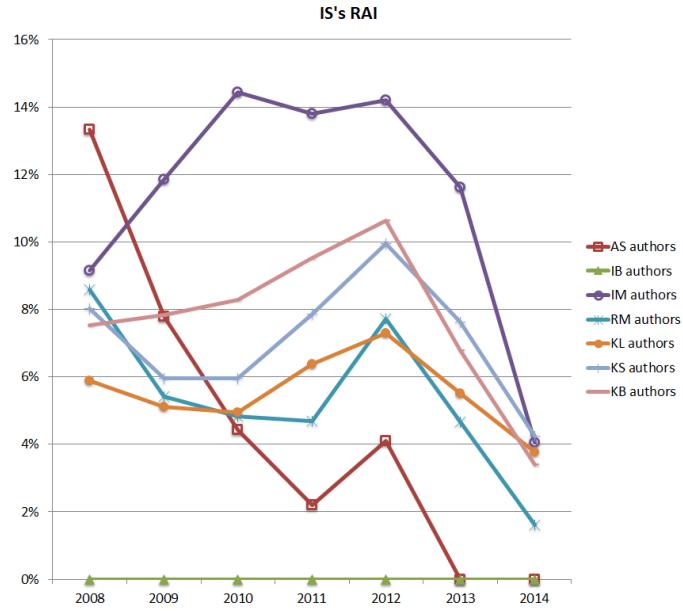
<Figure 2> Analysis of journal AS's states by RAI, 2008-2014  
(The Korean Journal of Archival Studies)



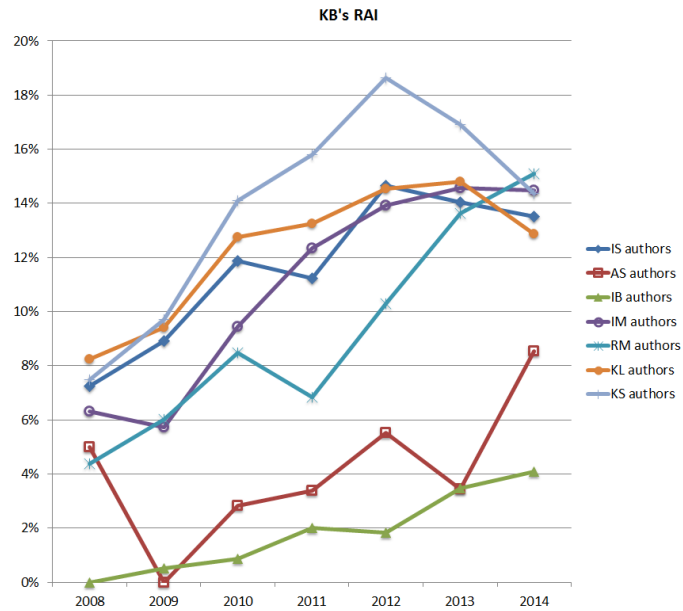
<Figure 3> Analysis of journal IB's states by RAI, 2008-2014  
(Journal of the Institute of Bibliography)



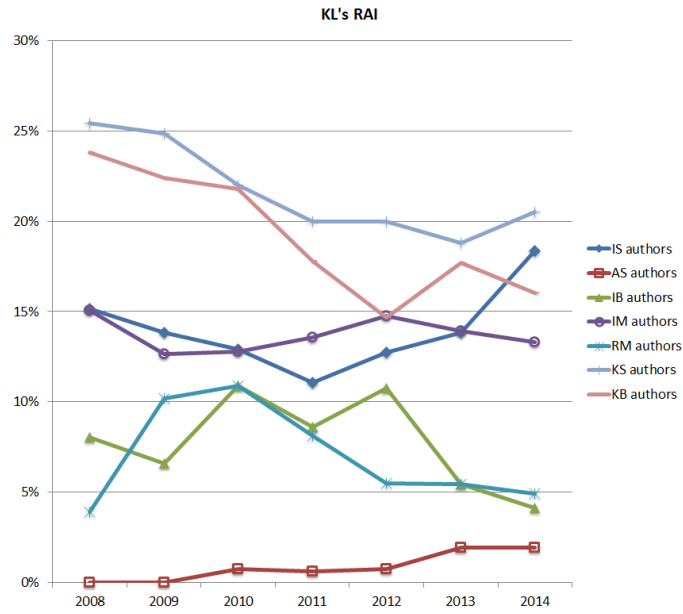
<Figure 4> Analysis of journal IM's states by RAI, 2008-2014  
(Journal of the Korean Society for Information Management)



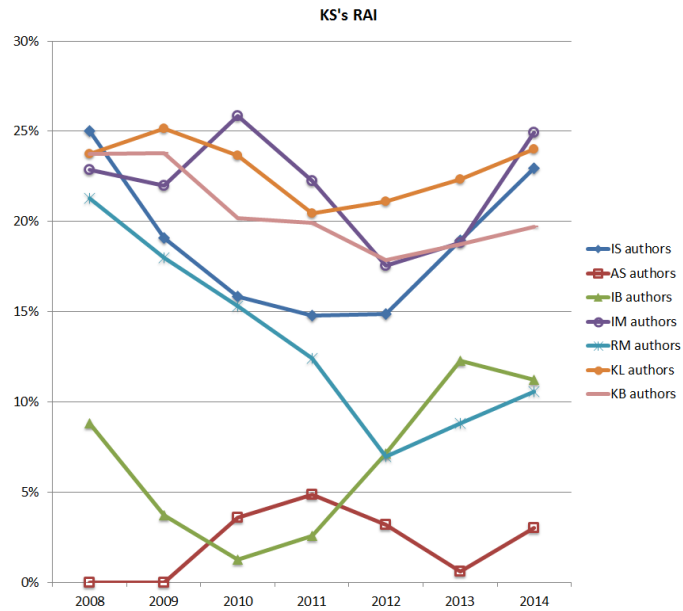
<Figure 5> Analysis of journal IS's states by RAI, 2008-2014  
(*Journal of Information Science, Theory, and Practice*)



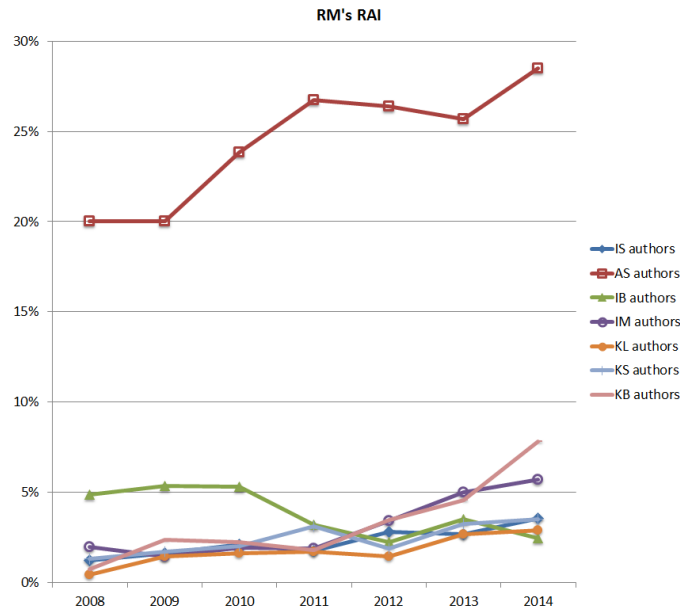
<Figure 6> Analysis of journal KB's states by RAI, 2008-2014  
(*Journal of the Korean Biblia Society for Library and Information Science*)



<Figure 7> Analysis of journal KL's states by RAI, 2008-2014  
(*Journal of the Korean Library and Information Science Society*)



<Figure 8> Analysis of journal KS's states by RAI, 2008-2014  
(*Journal of the Korean Society for Library and Information Science*)



<Figure 9> Analysis of journal RM's states by RAI, 2008-2014  
 (Journal of Records Management & Archives Society of Korea)

### 5. Conclusion

We investigated changes of Korean LIS journals with PPI and RAI. These two indicators were suggested to illustrate changes in scholarly journals according to journal coupling.

In the PPI analysis, the PPIs of RM and IS become reversed. These changes can be interpreted as a transition of author groups. RM didn't show a high intensity of author community in its early days, but its exclusive author community grew over the years (i.e., the number of authors who have published their papers only in RM becomes higher). This means that RM successfully formed exclusive relationships with certain authors. PPI proved to be useful for

the detection of how a newly launched journal settles within a domain.

The PPI of IS dropped below average in 2012. This journal was originally published in Korean, but was switched to English only in 2012. As a result, it attracted many new authors from abroad but its relationships with Korean researchers grew weaker. PPI analysis over a period of years proved to be effective in detecting changes of author groups connected to a scholarly journal and for illustrating the characteristics of a scholarly journal.

RAI, which is an index to measure the relationship between two journals by journal coupling, shows the degree of sharing authors. In the present study, we traced changes in journals' RAI over a period

of years to detect the degree of their attraction to Korean LIS researchers. IB did not consistently share authors with other journals, which means that this journal is isolated in the Korean LIS area. In addition, RAI analysis shows that IB has the most specialized research topic and its authors have the strongest loyalty to it.

Comparing RAI's data for RM to its data for IB and AS illustrates the changes undergone by RM in terms of Korean LIS researchers. From the start, RM showed the strongest relationship to AS. The degree of journal coupling between these journals is exceptionally high. These journals are strongly bonded because they share authors who are interested in archival studies.

The relationships of IM to IB can be interpreted as an unusual case. Most Korean LIS journals have shared authors to some degree, regardless their topic of coverage, but IM and IB didn't share a single author for the whole period of investigation. It seems

that these journals do not have overlapped research topics and their author community has built up in parallel without impacting each other.

As vehicles to examine the states of Korean LIS journals, PPI and RAI show that the journals have undergone meaningful changes. Journal coupling proved to be an effective feature for journal analysis. It can be used to illustrate journals' states in a specified domain as well as in a multidisciplinary area. In addition to topics, it can be applied to discover the states of scholarly journals in the international environment.

This study successfully illustrated the trend of Korean LIS research in the recent decade. The notable change is that record management and archival studies settle in LIS domain as a major research area. The information science seems to have no connection to bibliographic studies over a decade. In Korea LIS domain, these two research areas have developed without affecting each other.

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