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Library & Information Science Research 27 (2005) 51–72

Library & Information Science Research

Knowledge structure of library and information science in South Korea

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Available online 29 January 2005

Abstract

This article analyzes the knowledge structure of library and information science (LIS) in South Korea based on analysis of the theories presented in scholarly research articles. A content analysis of 654 LIS articles that appeared in two major journals since 1970 revealed overall theory use in LIS, such as growth and distribution of theory use by subfield, origin of theory, degree of theory use, and development of theory. The 654 articles analyzed used about eighty theories. The largest percentage of theories originated in LIS, followed by social science, sciences, and humanities. The degree of theory use indicates 2.10 in the 5 point ratio scale of the "Five Degrees of Theory Use Model." The proposed theory use model provides an analytical tool to delineate degrees of theory use in LIS. In short, the results of knowledge structure analysis in LIS research show that LIS in South Korea needs much more development in various fields.

1. Introduction

During recent years, a critical concern of scholars in library and information science (LIS) has been a need for relevant theoretical research. Research is the critical element in developing a theoretical base that enhances practice of the profession and guides future

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doi:10.1016/j.lisr.2004.09.004

development. Theoretical research produces ideas relevant to empirical research and helps researchers select research problems. One major function of research is to test the propositions of theoretical issues that describe the face appearance of phenomena or some segment of the observable world. The results of theoretical research develop more concrete formal theories.

Theory, as a conceptual base of a discipline, allows scholars to investigate critically phenomena and provides the impetus for research by provoking ideas about what is undiscovered. Theory is the ultimate destination as well as the starting point of research. Many previous studies have emphasized the importance of theory. Van Maanen (1998) contended that "having a theory is the mark of research seriousness, and may well be more essential to the field than whether the theory is true or false" (p. xxix). In order to delineate disciplinary boundaries and build a central body of knowledge, fields such as LIS should construct their own theoretical framework.

Theory is described as generalizations that could explain relationships among phenomena, a set of explanatory concepts, or a statement about how some part of the world works. Odi (1982) explained theory as "an internally connected and logically consistent proposition about relationships among phenomena" (p. 313). Other scholars have noted that theory is "a set of interrelated constructs, definitions, and propositions that present a systematic view of phenomena by specifying relations among variables, with the purpose of explaining and predicting the phenomena" (Kerlinger, 1986, p. 9); "a systematic explanation for the observed facts and laws that relate to a particular aspect of life" (Babbie, 1992, p. 55); "a model may be described as a framework for thinking about a problem and may evolve into a statement of the relationship among theoretical propositions." (Wilson, 1999, p. 250); or "a multiple-level component of the research process, comprising a range of generalizations that move beyond a descriptive level to a more explanatory level" (Glazier & Grover, 2002, p. 319).

Although these definitions differ slightly, there has been fairly good agreement as to what theories were good. Fawcett and Downs (1992) said that theories allow the imposition of order on naturally unordered experiences. They provide a systematic way of viewing random or chaotic experiences. Theories also provide a structure with which to look at the experiences, or at the data derived from the measurement of the experiences, and analyze the data in a coherent manner. They said that "the function of a theory then is to describe, explain or predict limited properties of reality" (p. 5). Glaser and Strauss (1967) propose that the role of theory is to enable explanation and some degree of prediction of behavior; to help both researchers and practitioners understand and have some control over as many situations as possible; to provide a perspective on behavior; and to guide research.

The need for theoretical research as a conceptual basis in LIS has been discussed in the literature for several decades. But there is little attempt to explore the contents of theories and degree of theory use in LIS. Research issues concerned with LIS theory research include, for instance, theory employment, growth of theory and theory distribution of subfields in LIS, theory origination, level of theory use, and level of theory efficiency.

2. Problem statement

Theory used by scholars in their research promotoes social status in their disciplines. One may hypothesize that the number and origin of theories used and applied in LIS literature reflects whether LIS constructs a unique theoretical base or not, and with which disciplines LIS has a close relationship. How many articles used theories? On what qualitative level did they use them? Content analysis of LIS theories, performed through conceptual and empirical study, can help to analyze the knowledge structure of the discipline.

This study addresses and analyzes how LIS researchers use theory, and examines what theories and subfields are used. In addition, a further purpose of this study is to examine the quantitative and qualitative characteristics of research articles that have contributed to theory use, and to interpret LIS' place in a scientific disciplinary world and illuminate inter-relationships among other disciplines.

3. Literature review

Jaervelin and Vakkari (1990) found that theory was used in 10% of the 449 empirical studies from 37 core journals in 1985. "The infrequent use of explanatory investigation suggests that there is little attempt in LIS to discover the regularities prevailing in the research area. This deficiency makes the formulation of theories more difficult" (p. 409). They also emphasized that this paradigm typically has made little use of such traditional scientific approaches as foundations and conceptual analysis, or of scientific explanation and theory formulation. This may be due to the fact that the discipline was born out professional practice and is therefore intimately connected with its problems.

Jeong (1993, p. 37) used content analysis to analyze the level of authors' theory building from 1970 to 1992 in South Korea. Of 338 research articles, 6.5% (22) contributed to theory building, and the average of theory efficiency was low level. Jeong proposed a model of theory efficiency based the concept of "efficiency of law." Theory efficiency refers to the range of variability in the values of one unit to the values of another unit in a relationship. Theory efficiency is determined by the narrowness of this range in unit values. It is a four-point scale for evaluating the precision of theories, and consists of four stages: relatedness, directionality, covariation, and rate of change. Relatedness is the lowest efficiency—it states whether or not there are significant relationships among theory units. The next higher level of efficiency is one that expresses the directionality of the relationships in either a positive or negative correlation. The third level of efficiency is covariation, which predicts change in one unit when the other unit alters. The highest level of efficiency states the rate of change in the relationship. This model assumes that theory with the highest efficiency level can exactly predict other changes of theory units.

Julien and Duggan's (2000) longitudinal analysis of the information needs and use literature showed that 18.3% of the 300 research studies sampled from 1984-1989 and 1995-1999 were theoretically based. McKechnie and Pettigrew (2002) conducted a content analysis of 1160 LIS articles published in six LIS journals between 1993 and 1998 to examined the

use of theory in LIS research. They reported an increase in theory use in that 34.2% of articles mentioned theory in either the title, abstract, or text for a total 1083 incidents of theory use or an average of 0.93 theory incidents per article. This study implies that the multidisciplinary background of LIS researchers provides a rich but still underutilized opportunity for the use and development of theory within LIS. They further pointed out that little research has actually examined the use of theory in LIS. The few existing studies concluded that most LIS research is atheoretical, reporting rates of theory use ranging from 10 to 21 percent (p. 407). In short, while the three studies mentioned suggest that theory use may be increasing since 1980s, the level of theory use is still low.

4. Research hypotheses

Four hypotheses were formed. The level of significance (p-value) of each hypothesis was set at $p \leq .05$. The first hypothesis is that there are no statistically significant differences in the subfields of research articles between two journals. It will test any differences or similarities in the 22 subfields between two journals. The second hypothesis is that there are no statistically significant differences in the origin of theory and in the use of theory between two journals. In other words, it will test the degree of theory use originated from LIS, social sciences, humanities, or sciences. The third hypothesis is that there are no statistically significant differences in the theory use pattern among subfields and journals. And, the last hypothesis is that there are no statistically significant differences in the degree of theory use between two journals. Each theory will be counted based on the five degrees of theory use model.

5. Procedures

Up to the mid 1990s, only two LIS journals had been published in South Korea. All research papers in the two journals published to 1999 were analyzed. A classification scheme of 22 subfields and five degrees of theory use model were developed for this analysis.

5.1. Data sources

Complete volumes of two core journals were selected because they have been the major journals since the beginning of LIS discipline in South Korea. Each journal has distinct characteristics. The *Journal of the Korean Society for Library and Information Science* (SLIS) is the foremost library science journal, oriented towards a broad spectrum of library science subjects. On the other hand, the *Journal of the Korean Society for Information Management* (SIM) publishes more information science articles than any other journal in South Korea. Both journals are published regularly by their own academic societies. Also, both journals publish only peer-reviewed research articles that cover most subfields of LIS

research. The sample size for each journal was exactly the same as the population until 1999 because all research articles were selected for this article.

(1) *Journal of the Korean Society for Library and Information Science* (SLIS) Coverage: Vol. 1(1970)–Vol. 33(1999), 389 articles
(2) *Journal of the Korean Society for Information Management* (SIM) Coverage: Vol. 1(1984)–Vol. 16(1999), 265 articles

Each article was coded in terms of publication productivity (e.g., by decade, or subfield of LIS), name of theory, subfield of article using theory, origin of theory (e.g., LIS, social sciences, humanities, or sciences), and degree of theory use (as categorized in this study, e.g., analytical evaluation, theory application, theory discussion, background review, or spot citing). Each theory was counted only once per analytical category.

Despite the definitions of theory mentioend earlier, it was quite difficult to delineate the exact boundary of "theory." No clear-cut definition comprises diverse use of the term in the articles. Therefore the author's description of each article in the study was used to make the determination. For example, if an author mentioned his or her research findings using the term "theory," "conceptual framework," "grounded theory," "paradigm," "grand theory," or "formal theory," then each finding was counted as theory. In short, this study tried to grasp "theory" as broadly as possible in order to include its broadest range of use in the literature.

5.2. Subfield classification scheme

Each theory used in LIS research was allocated to one or more of the 22 subfields in a classification scheme which presents a systematic and analytical breakdownt of LIS research.. If an article incorporated more than one theory, each theory was counted and allocated in the subfields. This subfield classification scheme is based on previous research (Jaervelin & Vakkari, 1990; Jeong, 1993). The subfields are as follows (parentheses denote the short keyword form):

1. General aspects of LIS (*Gen*)
2. Professions (*Prof*)
3. Library History (*His*)
4. Publishing/Copyright (*Pub*)
5. LIS Education/Library Education (*Edu*)
6. Research Methods/Methodology (*Meth*)
7. Collection Development and/or Collection Management (*Coll*)
8. Information/Reference Services (*Ser*)
9. Information User Study (*User*)
10. Library/Information Center Management and /or Administration (*Mag*t)
11. Library and Information Policy/Economics of Information/ Information Society (*Policy*)
12. Information Network/Cooperation/Scientific Communication (*Netw*)
13. Cataloging/Classification (*Cat/Cla*)

14. Abstracting/Indexing (*Abst/Index*)
15. Information System and/or Technology/Database (*Syst*)
16. Information Retrieval/Information Searching Process/ Evaluation (*IR*)
17. Library Automation/Digital Library (*Auto*)
18. Internet Information Resources/Multimedia (*Internet*)
19. Bibliometrics/Informetrics (*Biblio*)
20. Archival Materials (*Arch*)
21. Oriental Materials (*Ori*); and
22. Other Aspects of LIS (*Other*).

5.3. Five degrees of theory use

The degree of theory use is a direct indicator of discipline's knowledge structure. The demonstration of an accurate degree of theory use in a research article is the primary focus of this method. In some cases, it will be somewhat subjective or cognitive judgment. Each theory is analyzed according to the degree of theory use in LIS research that belongs to one of the following levels suggested in this study:

- Analytical Evaluation: a theory is most heavily used as the main theoretical basis throughout the article. For example, in Cole's (1993) article, Shannon's theory of communication was discussed from the point of view of uncertainty frequently throughout the paper.
- Theory Application: theory plays a role in conceptual underpinnings and is one of several critical research methods in the article. For instance, in this paper, Jaervelin and Vakkari's (1990) and Jeong's (1993) articles were reviewed not only as part of a literature review but also as an analytical method for the subfield classification scheme.
- Theory Discussion: there is an in-depth explanation of the theory itself. For example, in Wilson's (1999) article, he reviews the status of models of information behavior to discover how they relate one to another in detail.
- Background Review: background knowledge explains the core contents of theory, with bibliographic references. Most research articles provide literature review with a few lines of summary.
- Spot Citing: a theory is just referred to with a few words, without bibliographic reference. A good example would be "many theories in LIS are drawn from the social sciences, for example, attitude theory, behavior learning theory, diffusion theory, organization theory, and uncertainty theory."

6. Findings

6.1. Publication productivity

In the *Journal of the Korean Society for Library and Information Science* (SLIS), the overall top five productivity subfields were cataloging/classification (56 articles, 14.4%),

followed by LIS education (43 articles, 11.1%), information system (30 articles, 7.7%), information services (26 articles, 6.7%), and oriental materials (24 articles, 6.2%) (see Table 1). In the *Journal of the Korean Society for Information Management* (SIM), quite different subfields were ranked in the top five: information system (44 articles, 16.6%), information retrieval (43 articles, 16.2%), cataloging/classification (28 articles, 10.6%), abstracting/indexing (25 articles, 9.4%), and bibliometrics (19 articles, 7.2%). Together

Table 1
Publication productivity by subfield and by decade

Year	1970–79		1980–89		1990–99		Sub-Total		Total
Subfield	SLIS*	SIM**	SLIS	SIM	SLIS	SIM	SLIS	SIM	
Gen	1	-	-	1	4	7	5	8	13
Prof	3	-	3	1	13	5	19	6	25
His	4	-	7	-	8	-	19	-	19
Pub	1	-	1	3	5	6	7	9	16
Edu	4	-	15	-	24	6	43	6	49
Meth	-	-	-	1	2	-	2	1	3
Coll	-	-	7	-	10	9	17	9	26
Ser	2	-	6	1	18	7	26	8	34
User	-	-	2	3	16	5	18	8	26
Magt	1	-	2	2	16	7	19	9	28
Policy	1	-	2	5	17	3	20	8	28
Netw	3	-	2	4	14	8	19	12	31
Cat/Cla	6	-	14	6	36	22	56	28	84
Abst/Index	-	-	3	7	8	18	11	25	36
Syst	1	-	6	14	23	30	30	44	74
IR	-	-	3	13	18	30	21	43	64
Auto	-	-	1	4	6	4	7	8	15
Internet	-	-	-	-	8	10	8	10	18
Biblio	-	-	2	6	11	13	13	19	32
Arch	-	-	-	-	1	-	1	-	1
Ori	4	-	3	-	17	-	24	-	24
Other	-	-	1	2	3	2	4	4	8
Total	31	-	80	73	278	192	389	265	654

* SLIS: Journal of the Korean Society for Library and Information Science.
** SIM: Journal of the Korean Society for Information Management.

Table 2
Theory use by decade and by journal

Year	1970–79			1980–89			1990–99			Total		
Journal	A*	AT*	T*	A	AT	T	A	AT	T	A	AT	T
SLIS	31	6	9	80	14	29	278	37	67	389	57	105
SIM	-	-	-	73	26	57	192	48	98	265	74	155
Total	31	6	9	153	40	86	470	85	165	654	131	260

* A: number of articles, AT: number of articles using theory, T: number of theories used.

for the two journals one-third (33.9%) of research articles came from in the cataloging/classification, information system, and information retrieval subfields. Some subfields, for example research methods and archival material, were covered infrequently in both journals throughout three decades.

The first hypothesis concerned differences of publication productivity in the subfields between the two journals. The chi-square test indicated the differences were statistically significant in the subfields of publication productivity between the two journals, χ^2 (2, N = 21) = 57.44, (p = .000). The first hypothesis was not supported. The two journals showed distinct different roles and characteristics. Major publications of the SLIS were cataloging/classification, LIS education, information system, and information services subfields, which are recognized as more traditional library service area. On the other hand, the SIM published more technology and theory oriented areas such as information retrieval, information system, abstracting/indexing, and bibliometrics.

6.2. Theory use by decade and by journal

As shown in Table 2, 20% (131 out of 654) of the articles incorporated theories in their content. Across the 22 subfields, 260 incidents of theory use were identified. Each article has an average of 0.40 theories (260/654). Counting 131 articles that used theory, the average number of theory incidents per article is 1.98 (260/131). In analyzing the frequency of theory use within each journal, SLIS incorporated 105 incidents in 57 out of 389 articles (14.7%) and each article that used theory had 1.84 average incidents. The SIM showed 155 incidents of theory in 74 articles out of 265 articles (27.9%), with 2.09 average incidents.

6.3. Names and origin of theory

Theories were drawn from various disciplines, such as education, sociology, economics, psychology, management, communication, computer science, and linguistics. 80 different kinds of theories were identified over 30 years. As shown in Table 3, this study analyzed origins of theory from the broad disciplines of LIS, social sciences, humanities and sciences. The determination of the origins of theories is based on authors' major research areas and publications. For instance, because Zipf was a professor of linguistics in Harvard University, he belongs to the humanities.

The largest percentage of theories originated from LIS (46 theories, 57.5%), then social sciences (22 theories, 27.5%), sciences (10 theories, 12.5%) and humanities (2 theories, 2.5%). Although more than half of the theories were drawn from LIS, authors in LIS relied heavily on theories from the social science and sciences. Eighteen theories appeared more than five times in the two journals.

- Shannon and Weaver's Mathematical Theory of Communication (13);
- Small's Cocitation Analysis Technique (11);

- Bradford's Law of Scattering (10);
- Ranganathan's Classification Theory (10);
- Salton's Term Discrimination Value Weighting Technique (10);
- Cleverdon's Recall/Precision technique (9);
- Luhn's Term Frequency Theory (9);
- Zipf's Principle of Least Effort (8);
- Bookstein and Swanson's Automatic Indexing Probabilistic Model (7);
- Harter's Compound Poisson Weights Technique (7);
- Lotka's Productivity of Author (7);
- Burton and Kebler's Half-life (6);
- Cooper's Logical Relevance (6);
- Saracevic's Relevance Theory (6);
- Sparck Jones' Inverse Document Frequency (6);
- Zadeh's Fuzzy Set Theory (6);
- Belkin et al.'s ASK (5); and
- Kessler's Bibliographic Coupling (5).

These theories were mostly used in bibliometrics, information retrieval, index, classification, and general aspects of LIS subfields. Among 80 theories, 30 theories (37.5%) were used once, 14 theories (17.5%) twice, 11 theories (13.8%) three times, 4 theories (8.8%) four times, and 18 theories (22.5%) were used more than five times.

As shown in Table 4, authors used 80 theories for 260 incidents, or an average of 3.25 incidents per theory. The SLIS showed 105 incidents (LIS 57, social sciences 24, sciences 19, and humanities 5). The SIM was similar, with LIS 101, social sciences 13, sciences 37, and humanities 4 (a total of 155 incidents).

The second hypothesis tested for differences in the origin of theory and use of theory between the two journals. The chi-square test indicated two different results. The origin of theory used in authors' research was significantly different with the four kinds of origins, χ^2 (2, N = 4) = 12.26, (p = 0.007). But there was no statistically significant difference in the use of theory in terms of origination between the two journals, so called, linear-by-linear association, χ^2 (2, N = 2) = .01, (p = .922).

6.4. Degree of theory use

This study suggested the five degrees of theory use model in order to analyze aggregated use of theory. After each theory used in research articles was classified based on the model, the level of theory use was converted into a 5-point ratio scale: spot citing counted for 1 point, background review 2, theory discussion 3, theory application 4, and analytical evaluation 5. As shown in Table 5, the subfield of information retrieval had the highest incidence of theory use (28 theories, 73 incidents, 147 points, mean 2.01).

Overall, the degree of theory use in LIS research in South Korea during last three decades amounted to 2.10 points out of 5. This position is a little higher than the back-

Table 3
Name and origin of theory used by Journal (alphabetical order)

Name of theory	Origin*	Journal and subfield**		Freq
		SLIS	SIM	
(Adams) Equity Theory	SS	Prof(1)		1
(Alderfer) ERG	SS	Prof(1)		1
(Bates) Berrypicking Model	LIS	IR(1)	Syst(1)	2
(Belkin et al) ASK	LIS	IR(1)	Syst(3) IR(1)	5
(Berge) Graphs Theory	S	Netw(1)	Cla(1) IR(2)	4
(Blake and Mouton) Managerial Grid	SS	Magt(1)		1
(Bliss) Organization of Knowledge	LIS	Cla(3)		3
(Bookstein and Swanson) Automatic Indexing Probabilistic Model	LIS	Index(1) IR(1)	Index(2) IR(3)	7
(Bradford) Law of Scattering	LIS	User(1) Magt(1) Biblio(3)	Gen(1) Syst(1) Biblio(3)	10
(Brillouin) Info. Measurement Formula	S	Magt(1) Biblio(1)	Index(1) Syst(1)	4
(Brookes) Equation of Info. Science	LIS		Syst(1)	1
(Bruner) Phases of Interpretation	SS	Syst(1)		1
(Burton and Kebler) Half-life	LIS	Netw(1) Biblio(1)	Index(1) Biblio(3)	6
(Cleverdon) Recall/Precision	LIS	Syst(1) IR(3)	Index(1) IR(4)	9
(Cooper) Logical Relevance	LIS	IR(2)	Index(1) IR(3)	6
(Cooper) Expected Search Length Measure	LIS	IR(2)		2
(Cutter) Cataloging Theory	LIS		Cat(1)	1
(Dervin) Sense-making Model	SS	IR(2)	Syst(1)	3
(Dewey) Phases of Reflective Thinking	SS	Syst(1)		1
(Dubin) Efficiency of Law	SS		Gen(1)	1
(Ellis) ISP Model	LIS		User(1)	1
(Farradane) Relational Indexing	LIS		Index(2) Syst(1)	3
(Fiedler) Contingency Model	SS	Magt(1)	Magt(2)	3
(Garfield) Law of Concentration	LIS		Gen(1) Biblio(1)	2
(Goffman) Epidemic theory	LIS	Biblio(1)	IR(2)	3
(Greer and Hale) CARI Model	LIS		Magt(1) Syst(1)	2
(Gronroos) Service Quality Model	SS	Ser(1)		1
(Harbermas) Communicative Action Theory	SS		Gen(1) Auto(1)	2
(Harter) Compound Poisson Weights Technique	LIS	Index(1)	Index(3) IR(3)	7
(Harter) Psychological Relevance	LIS		IR(3)	3
(Herskovits) Acculturation Theory	HU	His(1)		1
(Herzberg) Motivation-Hygiene Theory	SS	Prof(3)	Magt(1)	4
(Hjøland and Albrechtsen) Domain Analysis Model	LIS		Gen(1)	1
(Houten) Iron Age of Cataloging	LIS		Cat(1)	1
(Ingwersen) ISP Model	LIS		Syst(1)	1
(Kelly) Five Phases of Construction	SS	Syst(1)		1
(Kessler) Bibliographic Coupling	LIS	Biblio(1)	IR(2) Biblio(2)	5
(Krikelas) Information Seeking Behavior	LIS	User(1)	Syst(1)	2

Table 3 (*continued*)

Name of theory	Origin*	Journal and subfield**		Freq
		SLIS	SIM	
(Kuhlthau) 6 ISP Model	LIS	User(1) Syst(1)	Magt(1)	3
(Lancaster) Relevance/Pertinence	LIS	IR(1)		1
(Likert) 4 Patterns of Management Theory	SS		Magt(2)	2
(Lotka) Productivity of Author	LIS	User(1) Biblio(3)	Gen(1) Biblio(2)	7
(Lubetzky) Cataloging Rules/Principles	LIS	Cat(1)	Cat(2)	3
(Luhn) Term Frequency Theory	S	Index(1)	Index(6) IR(2)	9
(Marchionini) 5 ISP Model	LIS		Syst(1)	1
(Markey and Cochrane)Searching Strategy Model	LIS	IR(1)	IR(2)	3
(Maslow) Theory of Need Hierarchy	SS	Prof(2) Edu(1)		3
(McClellan) Theory of Motive Acquisition	SS	Prof(1)		1
(McGregor) Theory X and Y	SS	Prof(1)	Magt(2)	3
(Mellon) Library Anxiety	LIS	Gen(1)	Gen(1)	2
(Minsky) Frame Theory	S		Syst(1)	1
(Mooers) Information System Utility	LIS		User(1)	1
(Morse) Book Check Model	LIS	Magt(1)		1
(Needham) Clump Theory	S		Cla(1)	1
(Osborn) Cataloging Crisis Theory	LIS		Cat(1)	1
(Parasuraman) Conceptual Model of Service	SS	Ser(1)		1
(Piaget) Children Development Theory	SS	Edu(1) Syst(1)		2
(Ranganathan) Classification Theory	LIS	Cla(8)	Cla(1) Index(1)	10
(Rosers and Kincaid) Convergence Model	SS	Netw(1)		1
(Rouse) Library Network Model	LIS	Netw(1)		1
(Salton) Term Discrimination Value Weighting Technique	S	Index(1)	Cla(1) Index(4) IR(4)	10
(Salton) Vector Space Model	S	IR(1)	Index(1) IR(2)	4
(Saracevic) Relevance Theory	LIS	Syst(1) Biblio(1)	IR(4)	6
(Schultz) Transforming Agriculture	SS	Syst(1)		1
(Shafer) Theory of Evidence	SS		Syst(1) IR(1)	2
(Shank) Conceptual Dependency Theory	LIS		Syst(2)	2
(Shannon and Weaver) Mathematical Theory of Communication	S	Index(3) Biblio(1) IR(2) Netw(1) Policy(1) Edu(1)	Gen(1) Netw(1) Index(1) IR(1)	13
(Skinner) Reinforcement Theory	SS	Edu(1)		1
(Small) Cocitation Analysis Technique	LIS	Pub(1) Biblio(1)	IR(2) Biblio(7)	11
(Sparck Jones) Inverse Document Frequency	LIS		Index(4) IR(2)	6
(Swanson) Subjective/Objective Relevance	LIS		IR(2)	2
(Swets) E-Measure	LIS	IR(2)		2
(Taylor) Value-Added Model	LIS		Policy(1)	1
(Taylor) Question-Negotiation Theory	LIS	User(1) IR(1)	Syst(1) IR(1)	4
(Von Bertalanffy) General System Theory	SS	Magt(1) Netw(2)	Magt(1)	4

(continued on next page)

Table 3 (*continued*)

Name of theory	Origin*	Journal and subfield**		Freq
		SLIS	SIM	
(Wilson) Situational Relevance	LIS		IR(1)	1
(Wilson) Information Seeking Behavior	LIS	Col(1) IR(1)	User(1) Syst(1)	4
(Wyer) Minimum/Maximum Theory	LIS	Ser(1)	Ser(1)	2
(Zadeh) Fuzzy Set Theory	S	IR(1)	Syst(1) IR(4)	6
(Zipf) Principle of Least Effort	HU	Magt(1) Index(1) Biblio(2)	Gen(1) Index(2) Biblio(1)	8
Total	80	105	155	260

* Origin: LIS-Library & Info. Science, SS- Social Sciences, S-Sciences, HU-Humanities.
** ( ) : Numbers are the frequency of theory use.

ground review level. SLIS (mean score 1.94) and SIM (mean score 2.20) did not differ significantly.

The third hypothesis is that there are no statistically differences in the theory use pattern among subfields and journals. The results revealed significant differences among subfields and journals, χ^2 (2, N = 65) = 88.01, (p = .025). But, as shown in Table 6, because most cells (83.5%) counted less than 5, the overall level of significance was weak. If the numbers of theories in each cell were increased, statistical meaning would be expected to have strong evidence.

Twenty theories received high scores (Table 7). Shannon and Weaver's Mathematical Theory of Communication (23 points) was used the most frequently in seven subfields. Three other theories received more than 20 points. These were Small's Cocitation Analysis Techniques (22), by Salton's Term Discrimination Value Weighting Technique (21), and Harter's Compound Poisson Weights Technique (21). Sixteen theories scored more than ten points, and were used a few subfields predominantly: indexing, information retrieval and bibliometrics.

The fourth research hypothesis tested for differences in the degree of theory between the two journals. The research hypothesis was supported, χ^2 (2, N = 5) = 7.38, (p = .117). As mentioned before, there was almost the same level of theory use between the two journals. Among 260 incidents, the degree of 'background research' ranked first in both journal (Table 8). Regardless of journals and time periods, the degree of theory use pattern shows similar trends.

Table 4
Origin of theory used by journal

Origin	Journal		Total
	SLIS	SIM	
LIS (Lib and Info Sci)	57	101	158
SS (Social Sciences)	24	13	37
H (humanities)	5	4	9
S (Sciences)	19	37	56
Total	105	155	260

Table 5
Five degrees of theory use by subfield and by theory (five points scale)

Subfield	Name of theory	Level of theory use (Freq.)*										Degree		Total (Mean)
		SLIS					SIM							
		SC	BR	TD	TA	AE	SC	BR	TD	TA	AE	SLIS	SIM	
General	(Bradford) Law of Scattering						1						1	
	(Dubin) Efficiency of Law									1			4	
	(Garfield) Law of Concentration						1						1	
	(Harbermas) Communicative Action Theory							1					2	
	(Hjøland and Albrechtsen) Domain								1				3	17
	Analysis Model													**(1.70)**
	(Lotka) Productivity of Author						1						1	
	(Mellon) Library Anxiety	1					1					1	1	
	(Shannon and Weaver)							1					2	
	Mathematical Theory of Communication													
	(Zipf) Principle of Least Effort						1						1	
Professions	(Adams) Equity Theory	1										1		
	(Alderfer) ERG	1										1		
	(Herzberg) Motivation-Hygiene Theory		1		2							10		
	(Maslow) Theory of Need Hierarchy				2							8		23
	(McClelland) Theory of Motive Acquisition	1										1		**(2.56)**
	(McGregor) Theory X and Y		1									2		
History	(Herskovitz) Acculturation Theory				1							4		**(4.00)**
Publishing	(Small) Cocitation Analysis Technique	1										1		**(1.00)**
Education	(Maslow) Theory of Need Hierarchy		1									2		
	(Piaget) Children Development Theory		1									2		
	(Shannon and Weaver)	1										1		6
	Mathematical Theory of Communication													**(1.50)**
	(Skinner) Reinforcement Theory	1										1		
Methodology	-													**(0)**
Collection	(Willson) Information Seeking Behavior		1									2		**(2.00)**
Info. Service	(Gronroos) Service Quality Model		1									2		
	(Parasuraman) Conceptual Model of Service		1									2		7
	(Wyer) Minimum/Maximum Theory	1						1				1	2	**(1.75)**

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Table 5 (*continued*)

Subfield	Name of theory	Level of theory use (Freq.)*										Degree		Total (Mean)
		SLIS					SIM							
		SC	BR	TD	TA	AE	SC	BR	TD	TA	AE	SLIS	SIM	
User	(Bradford) Law of Scattering		1									2		
Study	(Ellis) 8 ISP Model									1			4	
	(Krikelas) Information Seeking Behavior	1										1		
	(Kuhlthau) 6 ISP Model	1										1		
	(Lotka) Productivity of Authors		1									2		15
	(Mooers) Information System Utility							1					2	**(1.88)**
	(Taylor) Question-Negotiation Theory	1										1		
	(Wilson) Information Seeking Behavior)							1					2	
Management	(Blake and Mouton) Managerial Grid			1								3		
	(Bradford) Law of Scattering	1										1		
	(Brillouin) Info. Measurement Formula	1										1		
	(Fiedler) Contingency Model		1				1			1		2	5	
	(Greer and Hale) CARI Model									1			4	
	(Herzberg) Motivation-Hygiene Theory						1						1	33
	(Kuhlthau) 6 ISP Model							1					2	**(1.94)**
	(Likert) 4 Patterns of Management Theory							2					4	
	(McGregor) Theory X and Y						1	1					3	
	(Morse) Book Check Model		1									2		
	(Von Bertalanffy) General System Theory		1				1					2	1	
	(Zipf) Principle of Least Effort		1									2		
Policy	(Taylor) Value-Added Model										1		5	
	(Shannon and Weaver)	1										1		6
	Mathematical Theory of Communication													**(3.00)**
Network	(Berge) Graphs Theory		1									2		
	(Burton and Kebler) Half-Life		1									2		
	(Kessler) Bibliographic Coupling		1									2		
	(Rosers and Kincaid) Convergence Model		1									2		
	(Rouse) Library Network Model				1							4		18

	(Shannon and Weaver) Mathematical Theory of Communication	1				1					1	1	**(1.80)**	
	(Small) Cocitation Analysis Technique		1								2			
	(Von Bertalanffy) General System Theory	2									2			
Classification /Cataloging	(Berge) Graphs Theory						1					2		
	(Bliss) Organization of Knowledge		3								6			
	(Cutter) Cataloging Theory							1				3		
	(Houten) Iron Age of Cataloging							1				3		
	(Lubetzky) Cataloging Rules/Principles		1				1	1			2	5	40	
	(Needham) Clump Theory						1					2	**(1.90)**	
	(Osborn) Cataloging Crisis Theory							1				3		
	(Ranganathan) Classification Theory	5	3				1				11	2		
	(Salton) Term Discrimination Value Weighting Technique					1						1		
Indexing/ Abstracting	(Bookstein and Swanson) Automatic Indexing Probabilistic Model		1				2				2	4		
	(Brillouin) Info. Measurement Formula						1					2		
	(Burton and Kebler) Half-life						1					2		
	(Cleverdon) Recall/Precision						1					2		
	(Cooper) Logical Relevance						1					2		
	(Farradane) Relational Indexing							1		1		8		
	(Harter) Compound Poisson Weights Technique			1		1	1		1		4	7	93	
	(Luhn) Term Frequency Theory			1		1	5				4	11	**(2.48)**	
	(Ranganathan) Classification Theory							1				3		
	(Salton) Term Discrimination Value Weighting Technique		1			1	2		1		2	9		
	(Salton) Vector Space Model								1			4		
	(Shannon and Weaver) Mathematical Theory of Communication	1	1		1		1				8	2		
	(Sparck Jones) Inverse Document Frequency					1	2		1			9		
	(Zipf) Principle of Least Efforts		1				1		1		2	6		
Information System	(Bates) Berrypicking Model					1						1		
	(Belkin) ASK					1	1	1				6		
	(Bradford) Law of Scattering						1					2		
	(Brillouin) Info. Measurement Formula						1					2		

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Table 5 (*continued*)

Subfield	Name of theory	Level of theory use (Freq.)*										Degree		Total (Mean)
		SLIS					SIM							
		SC	BR	TD	TA	AE	SC	BR	TD	TA	AE	SLIS	SIM	
Information System	(Brookes) Equation of Info. Science							1					2	
	(Bruner) Phases of Interpretation		1									2		
	(Cleverdon) Recall/Precision	1										1		57
	(Dervin) Sense-making Theory							1					2	**(2.04)**
	(Dewey) Phases of Reflective Thinking		1									2		
	(Farradane) Relational Indexing							1					2	
	(Greer and Hale) CARI Model							1					2	
	(Ingwersen) ISP Model							1					2	
	(Kelly) Five Phases of Construction		1									2		
	(Krikelas) Information Seeking Behavior							1					2	
	(Kuhlthau) 6 ISP Model		1									2		
	(Marchionini) 5 ISP Model							1					2	
	(Minsky) Frame Theory								1				3	
	(Piaget) Children Development Theory		1									2		
	(Saracevic) Relevance Theory	1										1		
	(Schultz) Transforming Agriculture		1									2		
	(Shafer) Theory of Evidence						1						1	
	(Shank) Conceptual Dependency Theory							1	1				5	
	(Taylor) Question-Negotiation Theory							1					2	
	(Wilson) Information Seeking Behavior							1					2	
	(Zadeh) Fuzzy Set Theory										1		5	
Information Retrieval	(Bates) Berrypicking Model		1									2		
	(Belkin) ASK	1									1	1	4	
	(Berge) Graphs Theory							1	1				3	
	(Bookstein and Swanson) Automatic Indexing Probabilistic Model	1							3			1	6	
	(Goffman) Epidemic Theory							1	1				3	
	(Harter) Compound Poisson Weights Technique								1		2		10	

	(Kessler) Bibliographic Coupling						1	1				3	
	(Luhn) Term Frequency Theory						1	1				3	
	(Markey and Cochrane) Searching Strategy Model		1				1		1		2	6	
	(Salton) Term Discrimination Value Weighting Technique					1	2		1			9	
	(Salton) Vector Space Model	1					1		1		1	6	147
	(Shafer) Theory of Evidence								1			4	**(2.01)**
	(Shannon and Weaver) Mathematical Theory of Communication	1		1			1				4	2	
	(Small) Cocitation Analysis Technique						2					4	
	(Sparck Jones) Inverse Document Frequency						1		1			6	
	(Wilson) Information Seeking Behavior	1									1		
	(Zadeh) Fuzzy Sets Theory				1	3			1		4	7	
	(Dervin) Sense-making Theory	1	1								3		
	(Taylor) Question-Negotiation Theory		1			1					2	1	
	(Cleverdon) Recall/Precision		1	2		1	3				8	7	
	(Cooper) Expected Search Length Measure		2			2	1				4	4	
	(Cooper) Logical Relevance	1		1							4		
	(Harter) Psychological Relevance					1	2					5	
	(Lancaster) Relevance/Pertinence		1								2		
	(Saracevic) Relevance Theory					2	2					6	
	(Swanson) Subjective/Objective Relevance						2					4	
	(Swets) E-Measure	1		1							4		
	(Wilson) Situational Relevance					1						1	
Automation	(Harbermas) Communicative Action Theory						1					2	**(2.00)**
Internet	-												**(0)**
Bibliometrics	(Bradford) Law of Scattering	2			1	1	1		1		6	7	
	(Brillouin) Info. Measurement Formula			1							3		
	(Burton and Kebler) Half-life				1	1			2		4	9	
	(Goffman) Epidemic Theory			1							3		
	(Garfield) Law of Concentration						1					2	
	(Kessler) Bibliographic Coupling						2					4	74
	(Lotka) Productivity of Author	2			1		1		1		6	6	**(2.31)**

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Table 5 (*continued*)

Subfield	Name of theory	Level of theory use (Freq.)*										Degree		Total (Mean)
		SLIS					SIM							
		SC	BR	TD	TA	AE	SC	BR	TD	TA	AE	SLIS	SIM	
Bibliometrics	(Saracevic) Relevance Theory	1										1		
	(Shannon and Weaver) Mathematical Theory of Communication	1										1		
	(Small) Cocitation Analysis Technique						1	5		1			15	
	(Zipf) Principle of Least Efforts	2									1	2	5	
Archives	-													**(0)**
Orientals	-													**(0)**
Others	-													**(0)**
	TOTAL	**41**	**43**	**8**	**12**	**1**	**37**	**81**	**10**	**23**	**4**	**204**	**341**	**545**
				105					**155**			**1.94**	**2.20**	**210**

* SC: Spot Citing, BR: Background Research, TD: Theory Discussion, TA: Theory Application, AE: Analytical Evaluation.

Table 6
Degree of theory use by subfield and by journal (Mean scores)

Journal	Subfield											
	Gen	Prof	His	Pub	Edu	Meth	Coll	Ser	User	Magt	Policy	Netw
SLIS	1.00	2.56	4.00	1.00	1.50	0	2.00	1.67	1.40	1.86	1.00	1.89
SIM	1.78	0	0	0	0	0	0	2.00	2.67	2.00	5.00	1.00
	Cat/Cla	**Abst/Index**	**Syst**	**IR**	**Auto**	**Internet**	**Biblio**	**Arch**	**Ori**	**Other**		**Total**
SLIS	1.58	2.75	1.75	1.95	0	0	2.00	0	0	0		**1.94**
SIM	2.33	2.37	2.15	2.04	2.00	0	2.53	0	0	0		**2.20**

Table 7
Score and frequency of major theories

Name of theory	Score/ Frequency	Subfield of articles used theory (score/freq.)
(Shannon and Weaver) Mathematical Theory of Communication	23/13	Gen(2/1) Edu(1/1) Policy(1/1) Netw(2/2) Index(10/4) IR(6/3), Biblio(1/1)
(Small) Cocitation Analysis Technique	22/11	Pub(1/1) Netw(2/1) IR(4/2) Biblio(15/7)
(Salton) Term Discrimination Value Weighting Technique	21/10	Cla(1/1) Index(11/5) IR(9/4)
(Harter) Compound Poisson Weights Technique	21/7	Index(11/4) IR(10/3)
(Bradford) Law of Scattering	19/10	Gen(1/1) User(2/1) Magt(1/1) Syst(2/1) Biblio(13/6)
(Cleverdon) Recall/Precision	18/9	Index(2/1) Syst(1/1) IR(15/7)
(Zipf) Principle of Least Effort	18/8	Gen(1/1) Magt(2/1) Index(8/3) Biblio(7/3)
(Burton and Kebler) Half-life	17/6	Netw(2/1) Index(2/1) Biblio(13/4)
(Luhn) Term Frequency Theory	18/9	Index(15/7) IR(3/2)
(Zadeh) Fuzzy Set Theory	16/6	Syst(5/1) IR(11/5)
(Ranganathan) Classification Theory	16/10	Cla(13/9) Index(3/1)
(Lotka) Productivity of Author	15/7	Gen(1/1) User(2/1) Biblio(12/5)
(Sparck Jones) Inverse Document Frequency	15/6	Index(9/4) IR(6/2)
(Bookstein and Swanson) Automatic Indexing Probabilistic Model	13/7	Index(6/3) IR(7/4)
(Belkin et al) ASK	11/5	Syst(6/3) IR(5/2)
(Herzberg) Motivation-Hygiene Theory	11/4	Prof(10/3) Magt(1/1)
(Salton) Vector Space Model	11/4	Index(4/1) IR(7/3)
(Maslow) Theory of Need Hierarchy	10/3	Prof(8/2) Edu(2/1)
(Cooper) Logical Relevance	10/6	Index(2/1) IR(8/5)
(Farradane) Relational Indexing	10/3	Index(8/2) Syst(2/1)

Table 8
Degree of theory use by journal

	Journal		Total
	SLIS	SIM	
Spot Citing	41	37	78
Background Research	43	81	124
Theory Discussion	8	10	18
Theory Application	12	23	35
Analytical Evaluation	1	4	5
Total	105	155	260

7. Discussion

In the analysis of degree of theory use, there was a skewed distribution of theory use pattern between the two journals. SLIS used theories heavily in the subfields of professions, library education, information services, and information network. On the other hand, SIM used theories more intensively in the general aspects of LIS, indexing/abstracting, and information retrieval subfields. The other subfields used theories similarly between the two journals.

The results suggest increasing frequency in use of theory by South Korean scholars, but the degree of theory use is still at a low level on the five degrees of theory use model. LIS scholars paid little attention to methodology, terminology, and theoretical generalization of theory issues. Conceptual and empirical analyses should be undertaken to make clear the structure of LIS.

Other previous studies included the level of theory use in research articles by counting the proportion and frequency, however, this research is unique in two respects. It suggests a subfield classification scheme and a conceptual model of degree of theory use in LIS research. As a result, this study sugests the use of empirical evidence to support better understanding of theory use in academic journals.

8. Conclusion

LIS has established its own theoretical framework, and has shared theories with other disciplines to maintain its interdisciplinary characteristic. Although LIS theoretical research has a tendency to be dependent more on theories from other disciplines than on its own theoretical construct, the use of original theories appears to be gradually increasing. The proportion of theoretical articles using theories seems larger than earlier studies have shown.

This study is a first step toward generating an intellectual map of the LIS theoretical ground, applying citation analysis to the use of theory in LIS research. However, substantial further work remains to be done. What is needed is in-depth examination of substantive theories that have already been constructed by LIS authors. It is also necessary to determine the conceptual boundary of theory by investigating core concepts of the theories identified in this study, since this paper simply considered as theory anything described by one of the following keywords: theory, conceptual framework, grounded theory, paradigm, grand theory, and formal theory. Further work is also needed to conduct similar analyses on other LIS journals and to examine other time periods, coding categories, and countries.

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