

A Study on the Citation Behavior by Academic Background of Researchers*

전문연구자의 학문배경에 따른 인용행태에 관한 연구

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ABSTRACT

Although it has been a long subject of study why researchers prefer some cited documents to others, the existing relative researches have had a variety of perspectives on the nature and complexity of the citation behavior and not provided a complete answer to this question. In particular, Korea researchers mainly used statistical analysis of bibliographic information, which has limitations in revealing dynamic and complex cognitive aspects of the citation process. In this study, I investigate the citer perception of citing motives and bibliographic factors through survey and compared the responses according to the researchers' characteristics. After extracting the 22 motivations and 21 factors through the literature analysis and configuring a 5-point Likert scale questions, I conducted a survey in the way of an e-mail attachment. From the SPSS 22.0, the frequency analysis, t-test, and one-way ANOVA were performed on the 354 valid samples. As a result, it is found that supporting is considered the most important citing motive and social connection, self-citation have little influence. In the case of bibliographic factors, the journal's reputation was recognized the most influential factor and the number of pages and authors was the least. Significant differences in fields of study and research careers were showed in some parts. These results can substantiate earlier studies, determine whether the factors assumed influential in selecting references were intended, and suggest the search point to the specialty library or academic database.

초 록

연구주제와 관련된 다양한 자료들 중에서 특정 문헌이 참고문헌으로 선택되어 이용되는 인용과정은 오랫동안 많은 과학자들의 다양한 관점에 따라 연구되어 왔지만 아직까지 인용행태의 본질과 복잡성은 명확히 밝혀지지 않았다. 특히 한국의 경우 인용행태 연구에 있어 서지학적 요인에 대한 통계적 분석 연구방법이 주로 이용되었는데, 이 방법은 인용의 역동적이며 복잡한 인지적 측면을 밝히는데 한계가 있었다. 이에 본 연구는 설문조사를 통해 인용동기와 서지학적 요인에 대한 인용자들의 인식을 직접 알아보고, 응답결과를 인용자 특성에 따라 비교해 보았다. 문헌분석을 통해 22가지 인용동기와 21가지 서지요인을 추출하여 5점 Likert 척도문항을 구성한 뒤, 설문지를 이메일에 첨부하여 배포, 총 354부의 유효표본을 확보하였다. SPSS 22.0을 이용하여 빈도분석, 독립표본 t검정, 일원분산분석을 실시한 결과, 가장 중요하게 고려되는 인용동기는 '주장에 대한 증거제공'이었으며 '사회적 친분관계', '자기인용' 등은 영향력이 거의 없는 것으로 나타났다. 서지요인의 경우, 학술지의 명성이 인용선택에 가장 영향력이 크다고 인지되었으며 페이지수, 저자수, 저자성별의 영향력은 거의 없었다. 또한 전공분야, 연구활동경력에 따라 이러한 인식에 유의한 차이가 나타났다. 연구결과를 통해 선행연구를 실증하고, 인용빈도에 영향력이 크다고 가정되어온 요인들이 의도된 것인지를 확인할 수 있었으며, 전문도서관이나 학술데이터베이스의 검색지점 설정에 제언할 수 있었다.

Keywords: citation behavior, citation motivation, bibliometrics, professional researcher, reference analysis, survey analysis
인용행태, 인용동기, 계량서지, 전문연구자, 참고문헌분석, 설문분석

* 본 연구는 2015년도 전북대학교 석사학위논문을 수정·보완하였음.

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■ 논문접수일자: 2016년 3월 2일 ■ 최초심사일자: 2016년 3월 4일 ■ 게재확정일자: 2016년 3월 17일
■ 정보관리학회지, 33(1), 247-268, 2016. [http://dx.doi.org/10.3743/KOSIM.2016.33.1.247]

1. Introduction

Although there are diverse opinions on when compiling references became standard practice (Nicolaisen, 2007), since at least the late 19th century, researchers have been required to refer to bibliographic information of the documents used in their studies. Nowadays, citation is deemed “second nature” to scientists (Kaplan, 1965). Citation, the reference of the other works consulted in the course of research, is an indicator of citees’ academic influence as well as an effective means of producing and distributing information and of tracking academic development. To demonstrate its importance, a large number of citation-related studies have been carried out, ranging from simple citation counting or citation classification to more complex bibliographic coupling studies or citation motivation surveys (Liu, 1993a). Especially over the last 30 years, many researchers have been interested in the reason why individuals prefer to cite some documents over others. As a result, those working in several disciplines such as library science, sociology, and applied linguistics have published works that examine the complexity and fundamental norms in the process of reference selection, variously referring to their works as citation function, characteristics, motivation, classification, etc. However, these studies not only had a diversity of perspectives on the nature and complexity of citation behavior but also could not provide a perfect answer to the above question. In addition, most prior works inferred citer motivation through indirect method-context or content analysis, and those studies

which used surveys or interviews had small sample sizes (Bornmann & Daniel, 2006; Camacho-Minano & Nunez-Nickel, 2009). It was difficult to find large-scale cross-disciplinary empirical studies on this issue. In contrast to those working in the USA, Korean researchers have not only carried out this kind of study but also focused on determining the bibliographic factors affecting citation frequency based on statistical analysis of a reference list. However, the list cannot reveal any relationship between the citing study and the cited works except that the study is influenced by the works and, thus, the method is limited in its ability to reveal the dynamic and complex cognitive aspects of citation. In other words, more meaningful findings could be drawn by analyzing the context or contents of the text or asking the authors about their motivations directly.

This study aims to clarify the cognitive process involved in the citation process by asking authors about their motivations directly. This is because it is necessary for librarian or academic database to provide effective search points to the researchers (Kim, Kim, Kang, & You, 2011), and in order to increase the efficiency of the search, it is important to identify what factors the researchers actually consider in the process of reference selection. By statistically analyzing the responses, we can identify what issues the citer actually considers when including a document as a reference and whether the motivations or factors that impact the citer’s selection of previous works are the consequences of the citers’ conscious intention or by other parameters. Furthermore, this study classifies the characteristics

of scientists according to gender, international educational experience, research career, and field of study and investigates the cognitional differences caused by these characteristics. Based on the findings, it is possible to provide empirical data on existing research results, prove their validity, and suggest considerations for specialized academic libraries and databases.

2. Literature Review

2.1 The theory of citations

Over 30 years, two competing theories - normative theories and social constructivist theories - have developed to explain citation behavior, which are part of the sociology of science. According to the normative theory, scientists give credit to colleagues whose work they use by citing that work. Thus, a citation represents intellectual or cognitive influence on the scientific work (Merton, 1973). On the other hand, social constructivists dispute the assumptions of normative theory and argue that citations can be distorted by a number of factors such as social and psychological variables and memory, as well as external elements such as editor, reputation of the journal or author, document type, etc. That is, citation is the result of a mental state caused by a combination of the citers' views, attitudes, prejudices, and knowledge base, so there are many variables that must be considered in order to study the selection process of cited documents, not all of which can necessarily

be identified or quantified (Cronin, 1984; Gilbert, 1977; Moed & Garfield, 2004). To overcome limitations with this dichotomous distinction, Camacho-Minano and Nunez-Nickel (2009) suggested a multilayered reference selection model that separates the process into three steps and partially resolves the debate between the two theories.

2.2 Studies on citation motivations and bibliographic factors

In terms of methodology, empirical studies on citation behavior have been explored using two approaches- a context or content analysis as an indirect method and a survey or an interview as a direct method (Bornmann & Daniel, 2006). A citation context analysis seeks to illuminate inter-document relationships and devise a classification through a judgment of not the citer but the experts who read the work carefully and analyze the context surrounding the citations. (Cronin, 1984). Unlike a context analysis, a content analysis tries to characterize the cited documents based on the experts', rather than the citers', analysis of the semantic content of the cited passages (Liu, 1993b). A survey or an interview identifies the researchers' motivations by asking the authors directly about the reason they cited specific documents in their works. In Korea, there are a number of studies that have conducted statistical analysis of the bibliographic factors in reference lists and identify the characteristics of citing behavior of Korean researchers (Choi et al., 2011; Kim, 2012; Kim, Kim, Kang, & You, 2011; Nam, Seo, & Kim,

2011). This research method is distinguished from those described above because its purpose is to find trends in reference selection of a specific academic field based on the reference list rather than analyzing the reason for the citation. Nevertheless, it is related to citation behavior in a broader sense. The present study was conducted using this method.

3. Research Design

This study aims to reveal the motivations and bibliographic factors influencing citation by asking

questions directly to Korean researchers and comparing the differences according to the characteristics of each researcher, especially field of study. To draw up a questionnaire, this study compiled various studies related to the question of why authors cite from LISA (Library and Information Science Abstracts) and DBpia, using the key words “citation studies,” “citation behavior,” “citation motivation,” “citation analysis,” and “citation survey,” and conducted literature analysis to organize the motivational and bibliographic factors proposed in the previous works. <Table 1>, below, summarizes the motivations and factors suggested in the earlier studies.

<Table 1> A summary of citation motivations and bibliographic factors suggested in previous studies

Researcher(s)	The summarized motivations and factors suggested in the study
Merton (1973)	• recognition of the value of the work
Garfield (1996), Cronin (1981)	• paying homage, recognition of related work, methodology, provision of background reading, correction, criticism, substantiation, alerting to forthcoming work, authentication of data and fact, use of idea, concept, or definition
Chubin & Moitra (1975)	• Affirmative: essential, subsidiary: additional, perfunctory • Negational: partial, total
Cole (1975)	• related work(no specific), support for claims, use of concept, extension or modification of theory, interpretation of results, formulation of research • problems, test for a derivate theory, criticism, others
Moravcsik & Murugesan (1975) Cano (1989)	• conceptual, operational, organic, perfunctory, evolutionary, juxtapositional, confirmative, negational
Stewart (1983)	• Articles: lengthy, the number of reference, conformity with study area, etc • Author: reputation of institution, career, paper productivity, etc.
Brooks (1985, 1986)	• currency, negative credit, operational information, persuasiveness, positive credit, reader alert, social consensus
Vinkler (1987)	• Professional motivations: completeness, methodology, support for results, use of theory, criticism, foundation of the work • Connectional motivations: publicity, Paying homage, maintenance of professional connection, reputation of the author, reputation of the journal, citation by other related works, private benefit, need for more references
Snyder & Bonzi (1988, 1991)	• identification of related/previous work, use of data., substantiation of claims, critical analysis, demonstration of knowledge about important work, political pressure, rise in citation count, ease of access, forgotten, other reasons

Researcher(s)	The summarized motivations and factors suggested in the study
Hooten (1991)	<ul style="list-style-type: none"> • Frequently cited: essential-subsidiary, use of concepts, definitions, or interpretation, setting the stage, used of data • Infrequently cited: supplementary, casual, perfunctory, argumental/speculative /hypothetical
Liu (1993a, b)	<ul style="list-style-type: none"> • Indirect imperative: editorial policy, carrier influence: • Knowledge-claim factors: familiarity, persuasion, currency • Value perception: Number of references, eminent author, prestigious journal
Baird & Oppenheim (1994)	<ul style="list-style-type: none"> • conceptual, operational, organic, perfunctory, evolutionary, juxtapositional, confirmative, negational, historical background, description of other relevant work, supplying information or data, comparison, use of theoretical equation, methodology, additional information
Peters & van Raan (1994)	<ul style="list-style-type: none"> • sub-subject, number of reference, article type, number of pages, country of affiliation, number of co-author, impact of journal, language
Shadish et al. (1995)	<ul style="list-style-type: none"> • classic, negative, supportive, creativity, personally influential, social reasons
Wang & White (1996)	<ul style="list-style-type: none"> • foundation, methodology, empirical evidence, data sources, justification, comparison, contrast, ceremonial, completeness: expectations of editors, classic
Wang & White (1997)	<ul style="list-style-type: none"> • Motivation: comparison, contrast, reinforcement, data sources, identification of orientation, justification, methodology, ceremonial, use of theory & definition • Standard: authority, reader, availability, founder, time & effort topicality, discipline, prolific author, journal spectrum, relationship, novelty
Baldi (1998)	<ul style="list-style-type: none"> • Normative: theoretic, empirical, recent, quality • Social constructivist: reputation of institution and author, gender, social ties • Control: article's size, number of authors, authors working in a university, book chapter, journal visibility, impact factor, same author, same journal
Wang & White (1999)	<ul style="list-style-type: none"> • topicality, discipline, currency, authority, relation, actual quality, founder: publicity, reputation, author productivity, journal spectrum, peer review
Ahmed et al. (2004)	<ul style="list-style-type: none"> • historical, content, use of data, developed theoretical equation, same methods or techniques, normative process
Hanney et al. (2005)	<ul style="list-style-type: none"> • develop, support, apply, refute, note/review only • peripheral, limited, considerable, essential
Leimu & Koricheva (2005)	<ul style="list-style-type: none"> • author's gender, number of authors, alphabetical position of author's surname, country of affiliation, affiliated university
Van Dalen & Henkens (2005)	<ul style="list-style-type: none"> • Authors: reputation, affiliation USA, number of authors • Article: presidential address, type of document, number of pages, order in a journal issue • Journal: place of publication, use of French language, reputation, journal circulation, editorial board
Haslam et al. (2008)	<ul style="list-style-type: none"> • Author: gender, number, country of affiliation, reputation • institute: reputation of institute, reputation of journal, sponsorship • Article: title, length, figure / table, reference number, currency, methodology
Harwood (2009)	<ul style="list-style-type: none"> • signpost, support, Review, respect, criticism connection, publicity, further study, topical, foundations of research, proof of the ability
Kim et al. (2011)	<ul style="list-style-type: none"> • type of document, citation counts, ratio of citing different disciplines, language, place of publication, publisher, listed on global citation index service, electronic journal, year of publication
Choi et al. (2011)	<ul style="list-style-type: none"> • type of document, ratio of citing different disciplines, place of publication, impact of journal, year of publication
Nam, Seo, & Kim (2011)	<ul style="list-style-type: none"> • type of document, place of publication, reputation of journal, language, year of publication
Kim (2012)	<ul style="list-style-type: none"> • Author(first or reprint): country of affiliation, number • Collaboration with international researchers, Impact factor

To create a comprehensive questionnaire, the contents of previous works were analyzed, in which similar conceptual constituents were tied together and unique ones were added up regardless of the terminology used. As a result, 22 citation motivations and 21 bibliographic factors were extracted for the survey. <Table 2> gives detailed information on the motivations and factors in this study. They were measured on a 5-point Likert scale, where one point was given to the motivations and factors that were considered the least frequent and important, while five points were assigned to those that were the most

frequent and important.

This questionnaire contained some items with a nominal measure in order to demonstrate the validity of the findings on citation behavior in comparison with previous studies. At this point, not the latest article alone but the experience writing articles over the previous 2 years was taken into account for the purpose of investigating overall citation behavior. Researcher characteristics were divided according to gender, experience with studying abroad, field of study, and the total time an individual had been involved in research. The trial questionnaire was

<Table 2> Citation motivations & bibliographic factors

Symbol	Citation Motivations	Symbol	Citation Motivations
V1	Cited in most of the related works	V12	Supporting claims
V2	Establishment of the research perspective	V13	Identification of the relative/previous works
V3	Theoretical foundation	V14	Use of definition, theory
V4	Criticism	V15	Paying homage
V5	Contrast	V16	Defending plagiarism
V6	Background readings	V17	Further works
V7	Additional information	V18	Demonstration of recent knowledge
V8	Comparison	V19	Bridge between two subjects
V9	Methodology	V20	Social connection
V10	Justification	V21	Self-citation
V11	Use of data or fact	V22	Recommendation editors or reviewer
Symbol	Bibliographic Factors	Symbol	Bibliographic Factors
V1	Nationality of authors	V12	Year of publication
V2	Institution of authors	V13	Type of work
V3	Number of authors	V14	Online accessibility
V4	Gender of authors	V15	Availability closed membership
V5	Career of authors	V16	Number of pages
V6	Reputation of authors	V17	Title
V7	Position of authors	V18	Reputation of Journal
V8	Cooperation study	V19	The cited Frequency
V9	Language (Korean)	V20	Key words
V10	Language (English)	V21	Abstract
V11	Language (etc)		

sent to 15 professors and, based on 3 responses from those 15, the questionnaire was modified to reduce ambiguity and increase the validity of the questions. The modified questionnaire was distributed by e-mail informed on the University website. The first survey was conducted from May 2 2015 to April 27 2015 and 77 of 1,000 surveys were returned. Because of the low return rate, a second survey was distributed from July 10 2015 to July 10 2015 and 306 of 3,260 copies were sent back. As a result, a total of 383 questionnaires were collected, 354 of which were statistically analyzed as they were free from missing values. They were analyzed using frequency analysis and variance analysis (independent-sample t-tests and one-way ANOVAs) using the SPSS 22.0 computer program and, in the case of one-way ANOVAs, the Scheffé test was performed for post-verification.

In order to investigate differences in citation behavior caused by the characteristics of the research field, this study classified research fields into 5 categories: human sciences, social sciences, natural sciences, technical sciences, and arts and physical education, based on the DDC and the classification scheme of the Korean Research Foundation. However, it should be noted that citation practices vary depending on sub-fields (Klamer & Van Dalen, 2002; Lewison & Dawson, 1998) as well as broader research fields (Bazerman, 1988; Hargens, 2000; Hurt, 1987; Ziman, 2000). Thus, there is be a limit to the interpretation of the results in this study as a variety of research sub-fields had to be lumped into each category.

4. Findings

4.1 Profiles of the Respondents

The subjects of the study are scientists presently performing research activities including the publication of articles; responses from 354 scientists were used as the samples. <Table 3> displays further information about respondents' profiles.

There is a higher proportion of males (315, 89.0%) than females (39, 11.0%) and a higher proportion of researchers with foreign educational experience (202, 57.1%) than those without such experience (152, 42.9%). According to area of research, researchers in the technological field make up the highest percentage (130, 36.7%), followed by the social scientists (97, 27.4%) and natural scientists (81, 22.9%). It is assumed the reason for the low rates of respondents from the human science (24, 6.8%) and arts and physical education (22, 6.2%) fields had to do with the major consolidation and the major characteristics of researchers in those fields, who tend to focus more on the development of practical techniques rather than the publication of papers. With regard to the period of research activity, the percentage of respondents with less than 5 years' research activity (36, 10.2%) is the lowest, whereas that of those with more than 20 years' research experience (141, 39.8%) is the highest. The samples are thus skewed towards responses from researchers who had been working in their fields for long periods of time. This may be because the subjects were identified from e-mail addresses on university websites. In other

〈Table 3〉 Profiles of the respondents N(%) = 354(100)

	variable		frequency	percent (%)
Respondents Profile	gender	male	315	89.0
		female	39	11.0
	experience of studying abroad	Yes	202	57.1
		No	152	42.9
	period of study abroad	1-2 years	30	14.9
		3-4 years	33	16.3
		5-6 years	67	33.2
		7-8 years	48	23.8
		more than 9 years	42	20.8
	a field of study	human sciences	24	6.8
		social sciences	97	27.4
		natural sciences	81	22.9
		technological sciences	130	36.7
		art and physical education	22	6.2
	period of research activity	less than 5 years	36	10.2
		5-10 years	47	13.3
		10-15 years	62	17.5
		15-20 years	68	19.2
		more than 20 years	141	39.8

words, because the short-career researchers are still mostly Ph.D. candidates or instructors, their personal information, such as e-mail addresses, may not yet appear on the universities' websites.

4.2 Overall patterns of citation behavior

Before analyzing the differences in perception on the motivation for citations and bibliographic factors according to the respondents' characteristics, this study was compared to the findings from previous research.

First, 132 (37.3%) of the respondents answered "no" to a question on whether they had enumerated all material used in their reference lists over the last two years. To be specific, 19.5% of researchers

reported having had not cited some works deeply involved with their own articles and 27.7% have referenced some works even though the works were hardly related to their own studies. These results support the findings of MacRoberts and MacRoberts (1986) that authors do not cite all the works used and do not simply include only documents having much effect on their own studies, and suggest a limit to the basic assumption of evaluative bibliography and citation analysis following the normative theory.

Some researchers have pointed out that several articles citing the same document had an identical error in that document's bibliographic information, from which they concluded that there was a practice of reading not the original work but the cited text in other works, and used this point to criticize the

citation behaviors assumed by the normative theory (Moed & Vriens, 1989; Prabha, 1983). On the other hand, Sweetland (1989) regarded the causes of this error as lack of training in citation standards, a shortage of standardized citation formats, a common failure in the correct reproduction of a long string of characters, and etc. In the present study, 68.1% of the total respondents answered “yes” to a question regarding whether they cited or included documents in the reference list after reading only the abstract or a secondary source, not the full text of the original. This result contradicts Sweetland and supports the validity of the former statement on the error of bibliographic information appearing in the reference section.

Many social constructivists including Brooks (1986) have noted the complexity of motivations in citing papers. In a paper on Structural Engineering, Cano (1989) showed that motivations that are suppos-

edly dichotomous are in fact interrelated. Similarly, many researchers in Korea (73.7%) responded that more than two factors influenced their decision to select a work as a reference.

Soper (1976) identified an effect of the physical accessibility of a paper on its use as a reference based on the finding that the proportion of papers in a private collection used as references is higher than the proportion of papers available from the library. However, 27.1% of the respondents in the current study most commonly used portal sites such as Google Scholar as search tools, while only 2 of them chose personal collections. Based on this result, we infer that the development of Internet technologies renders online accessibility and availability, such as whether one has to register or pay a fee to access a paper, more impactful than physical accessibility. More detailed information on citation patterns is given in <Table 4>.

<Table 4> The overall patterns of citation behavior N(%) = 354(100)

	variable	frequency	percent(%)
Citation Behavior	Citing all the works used	Yes	222
		No	132
	Not citing very relevant works	Yes	69
		No	285
	Citing non-relevant works	Yes	98
		No	256
	Citing only after reading abstract or other works which use them	Yes	241
		No	113
	Acting more than two reasons simultaneously	Yes	261
		No	93
	Tools of retrieving references (Multiple analysis)	Portal sites	192
		Domestic academic Database	131
		Overseas academic databases	158
		Library website	98
		Library Collection	25
		Reference of relevant work	86
		The others	18

4.3 Analysis of the differences in perception of the citation motivations and bibliographic factors by respondents' characteristics

In order to examine the citers' recognition of the motivations and bibliographic factors involved in the citation decision, questions were rated on a 5-point Likert scale, where a higher score indicated greater importance of the factor. The reliability of the 22 motivations was measured as 0.806 (Cronbach's alpha), and that of the 21 factors was found to be 0.859.

Amongst all of the respondents, supporting their claims (4.16) was the most frequent reason for citing a paper, followed by providing ideas (4.15) and establishing a theoretical basis (4.13), which is consistent with the results of previous studies that found persuasion to be the main motivation for citation (Latour, 1987; Zuckerman, 1987). British sociologist, Gilbert (1977) concluded that researchers used citation to convince their peers of the value of their own findings, and to convince them that their findings should be considered important and true. Moed and Garfield (2004) also pointed out that scientists tended to cite the document widely considered to be the most authoritative in order to support their own findings and form an association with very important studies.

On the other hand, social acquaintance (1.51), a reviewer's recommendation (2.46), and self-citation (2.67) were found to have little influence on the selection of references, which disproves con-

structivist assumptions about the impact of interpersonal factors. As Frost (1989), Snyder and Bonzi (1991), and others have claimed, the motivations for self-citation seem to be comparable to the reasons for selecting the works of others. That is, the purpose of self-citation is not publicity or an increase in citation count for one's own work but the relevance of the content. Respondents in this study said that a reviewer's opinion did not have a significant impact on the decision to cite a certain paper, whereas Sievert and Haughwout (1989) suggested that an editor's intentions could affect the patterns of citation. But Sievert and Haughwout concluded not only that the differences between editors' may have an influence on the citation patterns but also that a similar study had to be carried out in other research areas to check whether this finding was limited to the specific focus of their study (education). In other words, they recognized that they did not control for other independent variables affecting citation patterns and, therefore, their results may be attributable to the trends or the specific paper types in an era (1978, 1980, 1983), rather than a more general effect of the editor. The difference between this study and that of Sievert and Haughwout (1989) may also be the result of the nationality of the study subjects, or the difference in the editors' locations (the United States vs. South Korea).

The overall recognized importance of bibliographical information is less than that of citation motivation. The reputation of the journal (3.75) is thought of as the most important factor in the se-

lection and the abstracts (3.64) and material type (3.59) are also considered fairly influential, while the number of pages (1.75), the number of co-authors (1.49), and the gender of the author (1.34) were found to have almost no influence. These results suggest that the reputation of a journal, as demonstrated in earlier works (Van Dalen & Henkens, 2005; Peters & van Raan, 1994; Haslam et al., 2008; Kim, 2003; Yeon, 2007) is of great consequence in intention to cite a certain paper. In addition, previous findings showing a difference in material types according to the fields of study (Yeon, 2007; Han & Kwon, 2008) can be regarded as a reflection of the researchers' preference for some types of materials over others. The perception of the quality of the abstract shows that the scientists focus on the content of the literature when determining what to use as a reference, which is consistent with the analysis of the citer's motivation mentioned above. As in earlier studies (Haslam et al., 2008), the present study shows that the gender of the authors has no influence on the decision whether or not to cite a paper. In contrast with the findings of many previous studies that showed a positive correlation between citation frequency and the number of co-authors (Baldi, 1998; Beaver, 2004; Lawani, 1986; Leimu & Koricheva, 2005; Wuchty, Jones, & Uzzi, 2007), the respondents of this study did not regard it as an influential factor. This gap implies that the impact of the number of authors on citation frequency is not the result of the citers' intention, and that

there is an unidentified parameter that links citation frequency to the number of authors that has nothing to do with conscious intention. On the other hand, Rousseau (2000) pointed out that although the citation frequency of multi-author papers was higher than that of single-author papers in some fields of research, it did not occur in all academic disciplines, so it is not true that papers by multiple authors are always cited more than those by one author. Still, in general, the more co-authors appear on a work, the more it is cited. Although earlier studies showed, via statistical analysis of bibliographic factors, that number of pages positively impacted citation frequency, researchers surveyed in this study hardly recognized the impact of the number of pages, which suggests that the relationship between the number of pages and the citation frequency is also not caused not by the citer's conscious intention but, likely, by the amount of information contained in the cited papers (Abt, 1993; Baldi, 1998; Stewart, 1990). Many previous studies suggested that the estimated citation frequency of a paper in the future is linearly correlated with the current citation frequency, acknowledging the impact of citation frequency (Burrell, 2003; Rabow, 2005). However, in this study, the researchers did not report the number of times a paper had been cited previously as a significant factor in the decision. <Table 5> shows the mean awareness of the influence of citation motivations and bibliographic factors.

〈Table 5〉 Mean awareness of the influence of citation motivations and bibliographic factors

Motives	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20	V21	V22
G	3.71	4.15	4.13	3.41	3.43	3.47	3.45	4.02	3.67	4.10	3.44	4.16	3.89	3.79	2.87	2.89	3.36	3.56	3.13	1.51	2.67	2.46
H/S	3.537	4.207	4.091	3.752	3.603	3.289	3.140	3.826	3.579	4.124	3.256	4.231	4.058	4.008	3.033	2.992	3.405	3.479	3.240	1.537	2.678	2.339
SCI	3.801	4.175	4.204	3.237	3.318	3.550	3.635	4.223	3.791	4.100	3.550	4.123	3.806	3.682	2.758	2.839	3.303	3.602	3.066	1.493	2.682	2.583
Hum	3.375	4.250	4.292	3.917	4.000	3.167	3.125	3.750	3.458	3.917	4.000	4.417	4.333	4.125	3.500	3.083	3.333	3.458	3.500	1.500	2.542	2.333
Soc	3.577	4.196	4.041	3.711	3.505	3.320	3.144	3.845	3.608	4.175	3.072	4.186	3.990	3.979	2.918	2.969	3.423	3.485	3.175	1.546	2.711	2.340
Nat	3.852	4.272	4.370	3.383	3.457	3.580	3.630	4.383	4.012	4.235	3.654	4.296	3.951	3.753	2.815	2.877	3.407	3.778	3.210	1.630	2.741	2.741
Tsc	3.769	4.115	4.100	3.146	3.231	3.531	3.638	4.123	3.654	4.015	3.485	4.015	3.715	3.638	2.723	2.815	3.238	3.492	2.977	1.408	2.646	2.485
Art	3.773	3.591	3.591	3.136	3.545	3.636	3.364	3.182	2.955	3.955	3.318	4.045	3.818	3.545	3.000	2.773	3.727	3.591	3.091	1.545	2.500	1.909
Factors	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20	V21	
G	2.35	2.41	1.49	1.34	2.23	2.79	2.17	1.93	2.45	3.04	2.21	3.48	3.59	3.51	3.03	1.75	2.78	3.75	2.97	3.44	3.64	
H/S	2.372	2.289	1.595	1.430	2.190	2.818	2.479	1.926	2.777	2.942	2.364	3.628	3.545	3.504	3.050	1.835	2.950	3.661	2.785	3.314	3.306	
SCI	2.341	2.455	1.417	1.275	2.213	2.763	1.972	1.915	2.218	3.137	2.137	3.441	3.569	3.498	3.000	1.692	2.602	3.848	3.081	3.507	3.820	
Hum	2.542	2.250	1.667	1.625	2.458	2.708	2.250	2.125	3.083	3.000	2.750	3.375	3.667	3.125	2.542	2.125	2.917	3.333	2.458	3.000	2.917	
Soc	2.330	2.299	1.577	1.381	2.124	2.845	2.536	1.876	2.701	2.928	2.268	3.691	3.515	3.598	3.175	1.763	2.959	3.742	2.866	3.392	3.402	
Nat	2.333	2.420	1.296	1.185	2.062	2.691	1.877	2.012	1.852	2.926	2.148	3.235	3.494	3.358	3.012	1.494	2.333	3.753	3.012	3.395	3.864	
Tsc	2.346	2.477	1.492	1.331	2.308	2.808	2.031	1.854	2.446	3.269	2.131	3.569	3.615	3.585	2.992	1.815	2.769	3.908	3.123	3.577	3.792	
Art	2.318	2.591	1.682	1.409	2.682	2.864	2.409	2.045	2.909	2.591	2.045	3.091	4.091	3.727	3.273	1.909	3.500	3.318	2.864	3.500	3.727	

4.4 Differences by gender, experience of studying abroad, and research careers

The perceived differences in citation motivation and bibliographic factors according to gender were assessed on two items (providing peripheral information, supporting the claims) of the 22 motivations and two items (online accessibility, availability) of the 21 factors. We analyzed peripheral information with a t-test and, because the F value was 0.865 and there was a significant level of homogeneity (0.352), the results were interpreted on the assumption of equal variance. The T value was 2.815, and the significance level was 0.005, so it can be said that male researchers consider providing peripheral information more important than do female researchers. However, because of some constraints of this study - the sample size of women was not

large enough to obtain a significant result and some variables, like field of study or length of research career could not be controlled - the argument that the gender of the citer produces a gap in citation behavior based on these levels of significance is a one-dimensional and inappropriate interpretation. So, more careful research is needed to see if the differences are attributable to the citer's gender or other parameters.

Two items (contrast, self-citation) of the 22 motivations are differently perceived by the researchers who have studied abroad and those who have not, whereas there not one of the 21 factors was perceived differently. In the case of self-citation, because both of the groups commonly have low values, it is difficult to say that the differences have significant implications. However, it is necessary to examine why the experience of studying abroad leads to a significant difference in the assessment of citation for contrast. <Table 6>

<Table 6> Differences by gender and experience of studying abroad

Motivation & Factors	gender	frequency	mean	standard deviation(SD)
Peripheral Information	male	315	3.50	1.042
	female	39	3.00	1.170
F=0.865, significance level(equal variance)=0.352, t=2.815, df=352, P=0.05, significance level=0.005				
Supporting Claim	male	315	4.12	.797
	female	39	4.44	.754
F=0.200, significance level(equal variance)=0.654, t=-2.343, df=352, P=0.05, significance level=0.020				
Online Accessibility	male	315	3.46	1.146
	female	39	3.97	0.986
F=7.440, significance level(equal variance)=0.007, t=-3.031, df=51.58, P=0.05, significance level=0.004				
Availability	male	315	2.98	1.244
	female	39	3.46	1.189
F=0.161, significance level(equal variance)=0.688, t=-2.286, df=352, P=0.05, significance level=0.023				
Motivation & Factors	studying abroad	frequency	mean	standard deviation(SD)
Contrast	Yes	202	3.56	.924
	No	152	3.25	1.037
F=2.382, significance level(equal variance)=0.124, t=3.005, df=352, P=0.05, significance level=0.003				
Self-citation	Yes	202	2.77	.981
	No	152	2.53	1.048
F=2.298, significance level(equal variance)=0.130, t=2.206, df=352, P=0.05, significance level=0.028				

shows the detailed results of the differences in perception according to gender and the experience of studying abroad.

Motivations for citing papers did not differ by length of research career. On the other hand, significant differences were found in four bibliographic factors: reputation of the author ($p=.035$), language (English) ($p=.030$), reputation of the journal ($p=.002$), and frequency of previous citations ($p=.007$). The Scheffe test shows that three factors (language, reputation of the journal, and frequency of previous citations) are more influential factors to scientists with less than 5 years of research experience than to those

with more than 20 years' experience. In particular, the longer they conducted research activity, the less the respondents considered the importance of the reputation of journal and the frequency of previous citations, which may indicate that budding researchers are affected by bibliographic factors considered to represent authority and credibility, whereas more senior researchers had already cultivated their own reputations and established their credibility. <Table 7> displays a detailed analysis of the differences in perception of motivations and factors according to the length of the research career.

〈Table 7〉 Differences by length of research career

Motivation & Factors	The research career	frequency	mean	SD	Scheffe	F	p
Reputation of the author	less than 5 years	36	3.25	1.204		2.618	0.035
	5-10 years	47	3.00	1.445			
	10-15 years	62	2.92	1.309			
	15-20 years	68	2.74	1.323			
	more than 20 years	141	2.57	1.278			
Language (English)	less than 5 years	36	3.61	1.315	less than 5 years > more than 20 years	2.718	0.030
	5-10 years	47	3.02	1.467			
	10-15 years	62	3.10	1.339			
	15-20 years	68	3.15	1.237			
	more than 20 years	141	2.82	1.376			
Reputation of the journal	less than 5 years	36	4.14	1.018	less than 5 years > more than 20 years	4.398	0.002
	5-10 years	47	3.91	1.139			
	10-15 years	62	3.92	1.045			
	15-20 years	68	3.93	1.027			
	more than 20 years	141	3.44	1.328			
Previous cited Frequency	less than 5 years	36	3.50	1.000	less than 5 years > more than 20 years	3.562	0.007
	5-10 years	47	3.19	1.209			
	10-15 years	62	3.05	1.234			
	15-20 years	68	2.93	1.213			
	more than 20 years	141	2.74	1.223			

4.5 Differences by field of study

Analysis of the differences between research areas shows significant differences in seven motivations for citation: providing ideas ($p=.012$), contrast ($p=.006$), providing peripheral information ($p=.002$), using the data or factual content ($p=.003$), supporting one's claim ($p=.045$), acknowledging the presence of relevant studies ($p=.029$), and reviewer's recommendation ($p=.028$), and in four bibliographic factors: language (Korean) ($p=.000$), year of publication ($p=.019$), number of pages ($p=.008$), and novelty

of the title ($p=.001$). The results of the Scheffe test show that researchers from the social sciences (4.20) and natural sciences (4.27) select works on the basis of the ideas they provide more frequently than do those from the art and physical education fields (3.59). The human scientists (4.00) use citation for contrast more frequently than do the technical scientists (3.23), which supports Cullars'(1990) context analysis that in papers published in Italy and Spain, neutral citations were more often used to offer opinions or interpretations than those of natural and technical science.

In addition, technical scientists (3.64) cite documents in order to provide subsidiary information more frequently than do social scientists (3.14), which is similar to the findings of Harwood (2008). Harwood found that signposting - citation of works providing more details on peripheral information - was first among eleven motivations in the computer science field, but sixth in the sociology field. This phenomenon may be related to a need to prevent long but minor details in equations or theories from distracting readers from the main stream of thought. Finally, in comparison with the social scientists (3.07), the human scientists (4.00) stated that they were more likely to select the original sources of data or factual material more frequently, which may be caused by the academic characteristics of production of study materials and is in

line with previous studies on citation behavior of those in the humanities (Cullars, 1990; Frost, 1989). In the case of bibliographic factors, the novelty of the title appears to be less influential for natural scientists than social scientists, as is the case for language (Korean), and human scientists are more influenced by the number of pages. Nonetheless, it is difficult to draw meaningful conclusions from these data because of the low means across all disciplines. However, we do consider it interesting that the novelty of the title was given a score of 3.5 in the art and physical education fields but was less than 3.0 in other sectors. The <Table 8> gives more information about the differences in perception of motivations for citation and bibliographic factors in the different research areas.

<Table 8> Differences by research areas

Motivations & Factors	a field of study	frequency	mean	SD	Scheffe	F	p
Providing ideas	human sciences	24	4.25	.608	social sciences, natural sciences > art and physical education	3.257	0.012
	social sciences	97	4.20	.799			
	natural sciences	81	4.27	.791			
	technological sciences	130	4.12	.859			
	art and physical education	22	3.59	.908			
Contrast	human sciences	24	4.00	.885	human sciences > technological sciences	3.676	0.006
	social sciences	97	3.51	.970			
	natural sciences	81	3.46	.975			
	technological sciences	130	3.23	.969			
	art and physical education	22	3.55	1.057			
Peripheral information	human sciences	24	3.13	1.035	technological sciences > social sciences	4.331	0.002
	social sciences	97	3.14	1.051			
	natural sciences	81	3.63	1.101			
	technological sciences	130	3.64	1.004			
	art and physical education	22	3.36	1.093			

Motivations & Factors	a field of study	frequency	mean	SD	Scheffe	F	p
Using data or factual content	human sciences	24	4.00	1.063	human sciences, natural sciences > social sciences	4.045	0.003
	social sciences	97	3.07	1.301			
	natural sciences	81	3.65	1.305			
	technological sciences	130	3.48	1.183			
	art and physical education	22	3.32	1.249			
Supporting claim	human sciences	24	4.42	.654		2.458	0.045
	social sciences	97	4.19	.821			
	natural sciences	81	4.30	.697			
	technological sciences	130	4.02	.816			
	art and physical education	22	4.05	.950			
Acknowledging relevant studies	human sciences	24	4.33	.702		2.742	0.029
	social sciences	97	3.99	.995			
	natural sciences	81	3.95	.986			
	technological sciences	130	3.72	.958			
	art and physical education	22	3.82	.907			
Reviewer's recommendation	human sciences	24	2.33	1.167		2.752	0.028
	social sciences	97	2.34	1.198			
	natural sciences	81	2.74	1.070			
	technological sciences	130	2.48	1.209			
	art and physical education	22	1.91	1.065			
Language (Korean)	human sciences	24	3.08	1.248	human sciences, social sciences, technological sciences, art and physical > natural sciences	8.539	0.000
	social sciences	97	2.70	1.218			
	natural sciences	81	1.85	1.050			
	technological sciences	130	2.45	1.227			
	art and physical education	22	2.91	1.444			
Year of publication	human sciences	24	3.38	1.056		2.994	0.019
	social sciences	97	3.69	.950			
	natural sciences	81	3.23	1.110			
	technological sciences	130	3.57	1.092			
	art and physical education	22	3.09	1.342			
Number of pages	human sciences	24	2.13	.900	human sciences > natural sciences	3.541	0.008
	social sciences	97	1.76	.863			
	natural sciences	81	1.49	.760			
	technological sciences	130	1.82	.843			
	art and physical education	22	1.91	.811			
Novelty of the title	human sciences	24	2.92	1.316	social sciences, art and physical education > natural sciences	4.648	0.001
	social sciences	97	2.96	1.353			
	natural sciences	81	2.33	1.285			
	technological sciences	130	2.77	1.248			
	art and physical education	22	3.50	1.300			

5. Discussion and Conclusion

By asking researchers directly about their perception of their motivations for selecting citations and the influence of bibliographic factors, we found that scientists in general choose references based on the relevance of the content of the cited works rather than respect, as assumed by the normative theorists, or interpersonal factors, as assumed by the social constructivists.

There were certain bibliographic factors, such as the number of co-authors or the nationality of the author (Leimu & Koricheva, 2005; Peters & van Raan, 1994), that were found to affect the citation frequency in previous studies, but that the respondents in this study hardly considered important. Our interpretation of these results is that citations are influenced not by the researchers' intentions but by external environmental factors. In many Korean studies using statistical analysis of bibliographic information, most of the disciplines except art commonly show a higher percentage of English than Korean works in the reference lists. Judging from our finding that the assessment of the importance of prestigious journals is high while the rating for the influence of language or nationality of a paper is low, the dependence on the foreign documents can be interpreted as a secondary result of the good reputations of certain foreign journals. Also, this

study shows that scientists are affected by factors such as the reputation of journals, document types, etc., which is useful information in aiding university libraries or academic databases to collect materials or refine searches. It can be possible for librarian or academic database to provide effective search points tailored to each discipline to the researchers and increase the efficiency of the search by using the results of this study.

Among researcher characteristics, gender and the experience of studying abroad do not seem to cause significant differences in the perception of the motivations for citation or the importance of bibliographic factors, whereas the differences in the length of research careers and areas of study appear to be influential.

In the further study, the more meaningful results can be found by using more systematic and refined questionnaire. If the survey is conducted on the citer motivation and bibliographic factors of the students in the master's or doctor's course, it is possible to not only analyze the difference between the professional researchers and the students but help them also in writing dissertation. Moreover, cognitive process of citation can be analyzed in more depth by using methodologies such as the observation or interview without a pre-defined checklist of motivations.

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