The Status of Nursing Leadership Studies: Its Invisible Network of Knowledge

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Abstract—To explore the intellectual structure of nursing leadership research in the last decade, the most crucial publications, most influential scholars, as well as the correlations among the publications of these scholars were identified. In this study, bibliometric techniques (citation analysis and cocitation analysis) were used to investigate the intellectual pillars of nursing leadership literature. By analyzing 92 394 citations of 1317 articles regarding nursing leadership published from 2003 to 2012 obtained from the Science Citation Index and Social Sciences Citation Index databases, a knowledge network of nursing leadership studies was mapped. The mapping results can be used to help identify the direction of nursing leadership research and provide a valuable tool for researchers to access the literature in this field.

Index Terms—Bibliometric technique, factor analysis, nursing leadership, timeline.

I. INTRODUCTION

In this paper, the problems arising from the struggle to establish nursing leadership were empirically investigated by examining the literature by using citation and cocitation data obtained from *Technovation*. A brief review of similar bibliometric studies is presented to introduce the approach, accompanied by a description of the data. The principal investigation was a factor analysis that was performed to determine the latent structure underlying the nursing leadership literature.

Citation and cocitation are essential research tools for evaluating the core knowledge of an academic field [1], [2]. A few studies using bibliometrics to examine leadership research have been published [3], [4], but almost none have reported cocitation analysis in the nursing leadership field. Therefore, conducting this study fills the gap in nursing leadership research by providing a detailed evaluation of applying citation and cocitation to nursing leadership research.

The aim of this study was to provide leadership researchers with a unique map to improve their understanding of leadership-related publications and to provide a systematic and objective map of various themes and concepts in the development of the leadership field. The linkages among publications were also identified and their statuses, positions, and contributions to the development of the nursing

leadership field were verified. Citation and cocitation analysis were the principal methods used, and a factor analysis was performed to identify the invisible network of knowledge generation underlying the nursing leadership literature. To explore the main changes in nursing leadership research in the last decade, the data was divided into two stages: the first 5 years and the second 5 years. A factor analysis was then conducted to map the intellectual structure of nursing leadership studies in these two periods. The changes in the key research topics and their implications for the evolution of nursing leadership research during the past decade are also discussed.

II. STUDIES OF ACADEMIC LITERATURE: CITATION AND COCITATION ANALYSIS

Various techniques can be used to examine a body of literature. The most frequently used method is the simple literature review whereby a highly subjective approach is used to structure earlier studies [5]. Objective and quantitative techniques have recently become popular as the online databases available are increasing. Bibliometrics, the application of mathematical and statistical techniques to the study of publications and professional communications, is an essential approach in multiple fields [6]. Two of the most indispensable and widely used tools are citation and cocitation analysis. Citation analysis is based on the assumption that authors cite papers they consider crucial for the development of their research, and that heavily cited articles are more likely to have exerted a substantial influence on the subject than those that are less frequently cited [7]. This tool was popularized by the work of Garfield [8], who applied citation analysis to preexisting indexes, the Science Citation Index (SCI) and Social Sciences Citation Index (SSCI).

A. Citation Analysis

The citation analysis method is mainly used to analyze the reference phenomenon or objects of journals, papers, and authors, and to explore the relationship between the sources of literature and citations. Implementing this method can help researchers understand the current state of development of certain disciplines, the literature usage characteristics in these disciplines, the correlations among disciplines in the literature, and future trends of research.

B. Cocitation

Cocitation is the frequency at which two documents or authors are cited together by recent papers [9]. A cocitation analysis of documents is conducted by recording the number of papers that have cited any particular pair of documents and

it is interpreted as a measure of the similarity of the content of the two documents. The approach is instrumental in identifying groupings of authors, topics, or methods, and can help clarify how these clusters interrelate [10]. Specifically, in cocitation studies, cocitation counts are compiled in matrix form and statistically scaled to record, at a distinct point in time, what is actually a changing and evolving structure of knowledge [11]. Therefore, cocitation analysis was considered an efficient method for measuring relationships and linkages between authors, papers, and journals to describe the mainstream or cutting-edge research in science [12].

III. METHODOLOGY

In this study, the SCI and SSCI were used for analysis. SCI and SSCI are widely used databases that include articles published in more than 8000 of the leading scholarly journals worldwide. Arguments that other online databases might also be used for such analysis exist; however, using SCI and SSCI provided the most comprehensive and most acceptable databases of nursing leadership publications. To collect the data, a keyword was used to identify the relevant article titles and abstracts in the SCI and SSCI. Using ''nursing leadership'' as the keyword, 1317 journal articles were collected, and those articles cited 92 394 publications as references.

TABLE I: THE MOST FREQUENTLY CITED JOURNALS: 2003-2012

Journal	Total Citation	Journal	Total Citation
Journal of Nursing Administration	1794	Nursing Administration Quarterly	313
Journal of Advanced Nursing	1735	Medical Care	304
Journal of Nursing Management	1290	Nurse Education Today	279
Journal of Clinical Nursing	601	Journal of Nursing Education	275
JAMA-Journal of the American Medical Association	540	Journal of The American Geriatrics Society	272
British Medical Journal	450	Nursing Outlook	267
Nursing Research	433	Quality & Safety in Health Care	216
Journal of Applied Psychology	407	Critical Care Medicine	187
International Journal of Nursing Studies	369	Journal of Professional Nursing	92
Nursing Economics	351	Research in Nursing & Health	67
Gerontologist	333	Journal of Nursing Care Quality	56
New England Journal of Medicine	321	Leadership Quarterly	56

The citation data used in this study included journal articles, authors, publication journals, publication dates, and cited references. Based on the objective of this study, the intellectual structure of nursing leadership between 2003 and 2012 was explored. This period was chosen because contemporary nursing leadership studies conducted during the last decade represent the most up-to-date and likely the most crucial research. Citation and cocitation analysis were the main methods used in this study. By using citation and cocitation analysis, three stages were assumed in this research, each of which required different approaches for examining the development of nursing leadership studies. First, the databases were identified as the sources of nursing leadership publications. Data collection and analysis techniques were then designed to collect information regarding research topics, authors, and journals on nursing leadership research.

Bibliometrics were employed to accomplish the following goals: 1) map the cocitation networks of the leadership studies from the past 10 years; and 2) examine the links between the primary scholars who authored key articles on nursing leadership research. The general procedure for cocitation analysis involves the following steps: 1) compilation of a raw cocitation matrix; 2) conversion of the data matrix to a correlation matrix; 3) analysis of the correlation matrix through factor analysis; and 4) interpretation and validation of the results [13]. The analyses were conducted using Ucinet 6.0 for Windows [14].

IV. RESULTS

A. Citation Analysis

To identify the key publications and scholars that have established the foundation of nursing leadership research, citation data were tabulated for each of the 1317 source documents and 92 394 references by using Microsoft Excel. The citation analysis produced remarkable background statistics, as shown in the following tables. Table I lists the most cited journals in the digital divide area during the previous decade, among which the *Journal of Nursing Administration*, *Journal of Advanced Nursing*, and *Journal of Nursing Management* were the three most cited journals. The general pattern of the most cited journals showed that nursing leadership research features journals that specifically discuss management, education, and nursing care.

TABLE II: HIGHLY CITED DOCUMENTS: 2003-2007

Full Citation Index For Document	Total Citations
Aiken LH, 2002, JAMA-J AM MED ASSOC, V288, P1987	19
Needleman J, 2002, NEW ENGL J MED, V346, P1715	14
Aiken LH, 2001, HEALTH AFFAIR, V20, P43	13
Institute of Medicine, 2004, KEEP PAT SAF TRANSF	13
Burns J. M., 1978, LEADERSHIP	12
Institute of Medicine, 2001, CROSS QUAL CHASM NEW	12
Rogers EM, 1995, DIFFUSION INNOVATION	12
Bass B. M., 1985, LEADERSHIP PERFORMAN	11
McCormack B, 2002, J ADV NURS, V38, P94	11
Porter-O'Grady T, 2003, J NURS ADMIN, V33, P173	11
Rycroft-Malone J, 2002, QUAL SAF HEALTH CARE, V11, P174	11
Kitson A, 1998, QUAL HEALTH CARE, V7, P149	10
SHORTELL SM, 1991, MED CARE, V29, P709	10
SHORTELL SM, 1994, MED CARE, V32, P508	10

The most cited and most influential documents by the most influential scholars were then identified using their total counts of citations within the selected journal articles. As shown in Table II, the most cited nursing leadership publication between 2003 and 2007 (the first 5 years) was "Hospital Nurse Staffing and Patient Mortality, Nurse Burnout, and Job Dissatisfaction" by Aiken, followed by "Nurse-staffing Levels and the Quality of Care in Hospitals"

by Needleman, and "Nurses' Reports on Hospital Care in Five Countries" by Aiken (Table II).

For the second 5 years (2008–2012), the most cited nursing leadership publication was "Hospital Nurse Staffing and Patient Mortality, Nurse Burnout, and Job Dissatisfaction" by Aiken, which is the same as in the first 5 years. The other two most cited publications were "Crossing the Quality Chasm: A New Health System for the 21st Century" by the Institute of Medicine and "The Relationship Between Nursing Leadership and Patient Outcomes: A Systematic Review" by Wong (Table III).

TABLE III: HIGHLY CITED DOCUMENTS: 2008-2012

Full Citation Index For Document	Total Citations
Aiken LH, 2002, JAMA-J AM MED ASSOC, V288, P1987	46
Wong Carol A, 2007, J Nurs Manag, V15, P508	39
Institute of Medicine, 2001, CROSS QUAL CHASM NEW	33
Bass B. M., 1985, LEADERSHIP PERFORMAN	29
Graneheim UH, 2004, NURS EDUC TODAY, V24, P105	29
Aiken LH, 2001, HEALTH AFFAIR, V20, P43	27
Aiken LH, 2000, NURS RES, V49, P146	26
McCormack B, 2002, J ADV NURS, V38, P94	24
Burns J. M., 1978, LEADERSHIP	23
Lincoln Y. S., 1985, NATURALISTIC INQUIRY	23
Institute of Medicine, 2004, KEEP PAT SAF TRANSF	22
Miles M.B, 1994, QUALITATIVE DATA ANA	22
Aiken LH, 2002, JAMA-J AM MED ASSOC, V288, P1987	46
Wong Carol A, 2007, J Nurs Manag, V15, P508	39

When the journal articles and books were combined, the six most cited scholars between 2003 and 2007 (the first 5 years) were Aiken, Laschinger, Bass, Rycroft-Malone, Estabrooks, and Shortell (Table IV). For the second 5 years, the six most cited scholars were Aiken, Laschinger, Bass, Castle, Kramer, and Estabrooks (Table V). These scholars exerted the greatest influence on the development of the digital divide area and thus collectively define this field. Their contributions represent the focus of the main research in the field and thus provide an indication of the popularity of certain nursing leadership topics as well as their historical value.

TABLE IV: HIGHLY CITED AUTHORS: 2003-2007

Author	Frequency	Author	Frequency
Aiken LH	85	Anderson RA	28
Laschinger HKS	44	Porter-O'Grady T	26
Bass B. M.	34	KRAMER M	22
Rycroft-Malone J	32	Grol R	21
Estabrooks CA	31	Stetler CB	21
Shortell SM	29	Rogers EM	20

TABLE V: HIGHLY CITED AUTHORS: 2008-2012

Author	Frequency	Author	Frequency
Aiken LH	203	Rycroft-Malone J	55
Laschinger HKS	198	Duffield C	52
Bass B. M.	83	Parse RR	51
Castle NG	74	McCormack B	49
Kramer M	58	Shirey MR	49
Estabrooks CA	55	Tourangeau AE	49

B. Cocitation Analysis

In this stage, data mapping was conducted and the intellectual structure of the current nursing leadership studies was revealed. Cocitation analysis is a bibliometric technique that information scientists use to map the intellectual structure of an academic field. It involves counting documents from a chosen field, either paired or cocited documents. To conduct cocitation analysis, cocitation counts

in matrix form are compiled and statistically scaled to record, at a distinct point in time, what is actually a changing and evolving structure of knowledge [15]. Cocitations were tabulated for each source document by using Microsoft Excel. Most of the authors had extremely limited cocitations that were either unlikely to have exerted a considerable influence on the development of the field or were too new to have had time to affect the literature. To facilitate analyses and improve the probability of its success, it was ensured that all authors in the final set had at least 30 citations in the first 5 years and 30 in the second 5 years. The cocitation correlation matrix was factor analyzed using varimax rotation, a commonly used procedure that attempts to fit (or load) the maximum number of authors in the minimum number of factors. The diagonals were considered missing data and the criterion for omitting the two cases were applied [16].

Three factors were extracted from the data in the first 5 years (2003–2007) and together, 65.8% of the variance in the correlation matrix was attributable to these factors. Table 6 lists the three most crucial factors and the authors that had a factor loading of at least 0.5. As is standard in this type of analysis, authors with less than a 0.5 loading or with cross-loadings were eliminated from the final results [17]. Names were tentatively assigned to the factors based on how the authors with high loadings were interpreted. The interpretation of the analysis results was that nursing leadership research in this period comprised at least three different subfields: job satisfaction, evidence into practice, and communication (Table VI). Because the remaining factors had small eigenvalues, they were not interpreted. They were also excluded from Table VI.

TABLE VI: AUTHOR FACTOR LOADINGS: 2003-2007

Factor1: Nurses' job satisfaction	variance	Factor2: Evidence into practice	variance
Blegen MA	0.833	Estabrooks CA	0.87
Needleman J	0.806	Wallin L	0.826
Buerhaus PI	0.765	Stetler CB	0.821
Maslach C	0.734	Rycroft-Malone J	0.781
Porter-O'Grady T	0.734	Harvey G	0.727
Laschinger HKS	0.716	Mccormack B	0.712
Baggs JG	0.705	Kitson A	0.692
Shortell SM	0.664	Benner P.	0.618
Kramer M	0.539	Grol R	0.514
Factor3: Communication	variance		
Rogers EM	0.612		
Anderson RA	0.578		
Grol R	0.574		
Schnelle JF	0.571		
Department of Health	0.555		

The first factor that appears in Table VI is job satisfaction, as defined by Blegen. In a previous metaanalysis, Blegen [18] observed that job satisfaction was most strongly correlated with job stress and moderately correlated with communication with supervisors, autonomy, and communication with peers. In addition to job satisfaction, autonomy, job stress, and nurse–physician collaboration were major concepts in the metaanalysis [18]. Another study revealed that multiple RNs asserted that they were working harder than ever, that work satisfaction and morale were suffering, and that the quality of patient care has deteriorated over the past few years [19].

The second factor was defined by Stetler, Ritchie, Rycroft-Malone, Schultz, and Charn. Organizational context is receiving attention from researchers across multiple disciplines as a potential factor in the successful implementation of evidence into practice. Evidence-based practice (EBP) is an approach expected to improve the quality of patient care and service delivery in health care systems. Based on Stetler, Ritchie, Rycroft-Malone, Schultz, and Charn's finding [20], the most influential EBP leaders were of long-standing tenure at the time of the site visit and have been present from the start or before the initiative, have been visibly progressing, and possess a continuing and deep commitment to EBP. The results of the study by Stetler et al. [20] were also consistent with qualitative findings that indicated that the role model site's leadership, culture, and related staff attitudes were more developed regarding the support of EBP [20].

The third factor representing the communication of nursing leadership was defined by Everett and Kincaid [21]. Everett and Kincaid [21] argued that communication research has been hampered in the past by a research paradigm that, like that of most surveys, uses only the individual as the unit of analysis. The result was theory unable to effectively process human communication as a "process of mutual information exchange." To obtain a thorough understanding of human behavior, Everett and Kincaid [21] sought to upgrade communication theory by incorporating social network concepts into the related methodology.

Similarly, studies on nursing leadership have also focused on different research themes between 2008 and 2012, and more than 68% of the variance in the correlation matrix of the second 5 years were attributable to these studies, as demonstrated in Table VII, which lists the eight most crucial factors along with the authors that had a factor loading of at least 0.5. Names were also tentatively assigned to the factors based on how the authors with high loadings were interpreted. The interpretation of the analysis results was that nursing leadership research in this period also comprised at least three different subfields:

The first factor that appears in Table VII is nursing leadership as defined by Shirey and Fisher. Just as Shirey and Fisher mentioned [22], nurses identified leaders' empowering behaviors (inclusive of support) as crucial requirements of the desirable practice environment necessary for nurse retention. Without support for external development and networking, organizations might not be able to systematically guarantee a common staff awareness of industry trends and issues that promote optimal patient care. Leaders play a pivotal role in nurse retention by shaping the health care practice environment to produce quality outcomes for nurses and patients [22].

The second factor was evidence into practice of nursing leadership. According to McCormack [23], leaders must combine the "science" component of health care practice (the application of science and technology) and the "art" component (the translation of different forms of practice knowledge) into caring actions. Making such values explicit enables the creation of a measurement framework that reflects both existing and intended practice cultures.

The third factor was defined by Akerjordet and

Severinsson, and identifies the value of emotional intelligence in nursing leadership. Akerjordet and Severinsson [24] mentioned that emotional intelligence in leadership skills is vital for creating a supportive environment and facilitating positive empowerment processes that lead to subjective well-being. The emotional intelligence of a leader is critical in effective nurse leadership because it enables the means to build on existing strengths for the common good. In addition, nurse leaders with emotional intelligence behave authentically and supportively, fostering a healthy environment and creating a work climate characterized by wisdom, innovation, and change.

TABLE VII: AUTHOR FACTOR LOADINGS: 2008-2012

Factor1: Work Environment	variance	Factor2: Evidence into Practice	variance
Cummings G	0.678	Benner P.	0.748
Duffield C	0.857	Estabrooks CA	0.672
Estabrooks CA	0.593	Kitson A	0.763
Lake ET	0.94	McCormack B	0.727
Laschinger HKS	0.787	Rycroft-Malone J	0.819
Manojlovich M	0.881		
Pronovost PJ	0.742		
Shirey MR	0.825		
SHORTELL SM	0.505		
Tourangeau AE	0.916		
Castle NG	0.407		
Factor3: Emotional Intelligence	variance		
Akerjordet K	0.855		
Wong Carol A	0.667		
Shirey MR	0.4		

TABLE VIII: HISTORICAL TIMELINE OF NURSING LEADERSHIP: 2003-2007

Timeline	Citations	Type	Title
1978	12	B	Burns J. M., LEADERSHIP
1984,	8	B	Benner P., NOVICE EXPERT EXCELL
1985	11	B	Bass B. M., LEADERSHIP PERFORMAN
1991	10	J	SHORTELL SM, MED CARE, V29, P709
1994	10	J	SHORTELL SM, MED CARE, V32, P508
1994,	9	J	AIKEN LH, MED CARE, V32, P771
1995	12	B	Rogers EM, DIFFUSION INNOVATION
1995	8	J	MCNEESESMITH D, J NURS ADMIN, V25, P17
1997	9	J	Morrison RS, J NURS ADMIN, V27, P27
1998	10	J	Kitson A, QUAL HEALTH CARE, V7, P149
1999	7	J	Antrobus S, J ADV NURS, V29, P746
2000	7	J	Aiken LH, NURS RES, V49, P146
2001	13	J	Aiken LH, HEALTH AFFAIR, V20, P43
2002	19	J	Aiken LH, JAMA-J AM MED ASSOC, V288, P1987
2002	14	J	Needleman J, NEW ENGL J MED, V346, P1715
2002	11	J	Rycroft-Malone J, QUAL SAF HEALTH CARE, V11, P174
2003	11	J	Porter-O'Grady T, J NURS ADMIN, V33, P173
2003	9	J	Porter-O'Grady T, J NURS ADMIN, V33, P105

C. Research Timeline

The objective of this paper was to trace the evolution of the intellectual structure of the nursing leadership field. The historical timeline of research concepts, themes, and methods in 2D scale provides a clear overview of the nursing leadership research path in the period from 2003 to 2012 (Figs. 1 and 2). Dramatic changes are affecting the world of

work; therefore, the main topics in nursing leadership studies are also changing. Common topics include increased human factor, the impact of nursing leadership, the shift from vertically integrated hierarchies to networks of specialists, hospital managers, and the change in the paradigm of performing safe operations from performing surgery to providing a service. In addition, the definition of work itself is evolving; the idea of a job as a fixed collection of tasks is disappearing, and there is a new emphasis on constantly evolving practices to fulfill the ever-increasing demands of patients. Hospital managers have a great opportunity to contribute to the betterment of human welfare in the context of these changes. However, leading this change rather than simply following it requires a break from traditional practices and a focus on rigorous research that addresses emerging trends. Several new and old topics and keywords demonstrate the view of nursing leaders as a dynamic entity in constant interaction with their environments, as shown in Tables 8 and 9 and Figs. 1 and 2. In other words, hospitals must adapt to the substantial changes that are occurring regarding precludes, management, and service values.

TABLE IX: HISTORICAL TIMELINE OF NURSING LEADERSHIP: 2008-2012

| Timeline	Citations	Type	Title
1978	23	J	Burns J. M., LEADERSHIP
1984	21	J	Benner P., NOVICE EXPERT EXCELL
1985	29	B	Bass B. M., LEADERSHIP PERFORMAN
1985	23	J	Lincoln Y. S., NATURALISTIC INQUIRY
1994	22	J	Miles M.B, QUALITATIVE DATA ANA
1998	19	J	Kitson A, QUAL HEALTH CARE, V7, P149
1999	20	J	Laschinger HKS, J NURS ADMIN, V29, P28,
2000	26	J	Aiken LH, NURS RES, V49, P146
2001	27	J	Aiken LH, HEALTH AFFAIR, V20, P43
2002	46	J	Aiken LH, JAMA-J AM MED ASSOC, V288, P1987
2002	24	B	McCormack B, J ADV NURS, V38, P94
2002	20	J	Lake ET, RES NURS HEALTH, V25, P176
2003	20	J	Anderson RA, NURS RES, V52, P12
2004	29	J	Graneheim UH, NURS EDUC TODAY, V24, P105
2006	20	J	Sellgren Stina, J Nurs Manag, V14, P348,
2007	39	J	Wong Carol A, J Nurs Manag, V15, P508
2008	19	J	Aiken LH, J NURS ADMIN, V38, P223
2010	19	J	Cummings GG, INT J NURS STUD, V47, P363
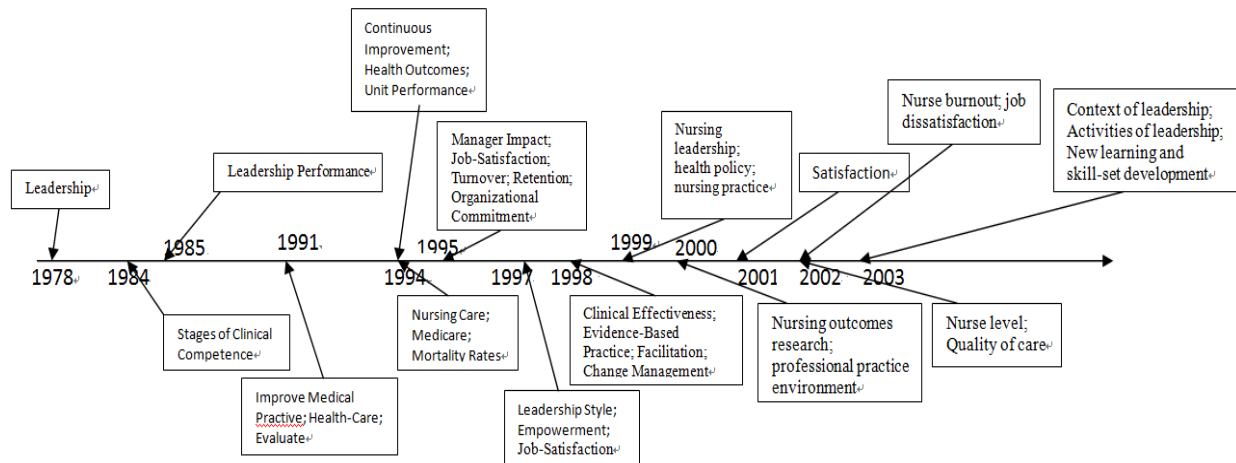
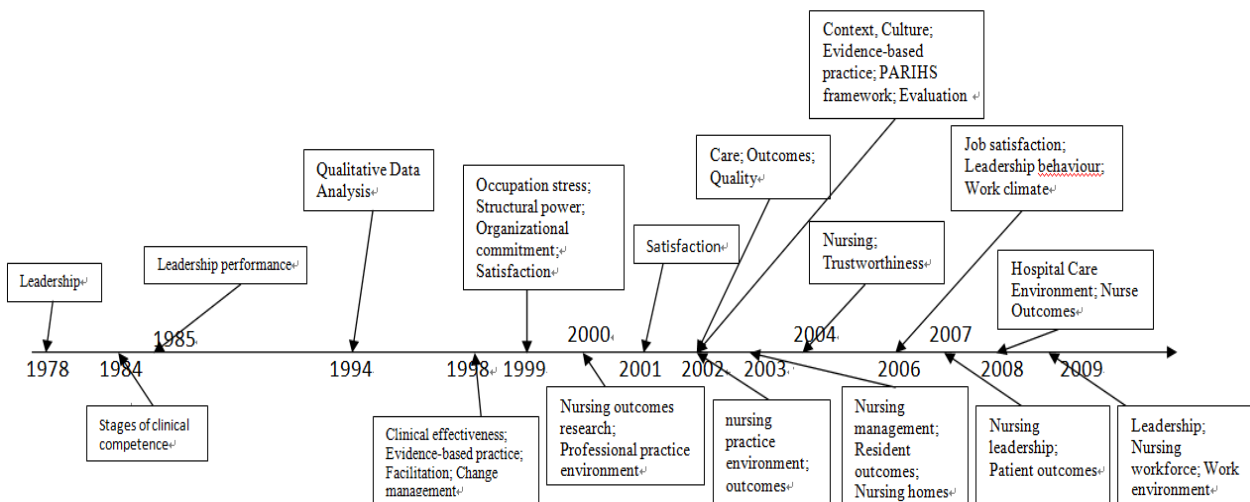Fig. 1. Research topics and keywords historical timeline of nursing leadership: 2003-2007.

Fig. 2. Research topics and keywords historical timeline of nursing leadership: 2008-3012.

V. CONCLUSION

Nursing leadership was extensively studied during the past decade. In this study, nursing leadership research was investigated using citation and cocitation data published in the SCI and SSCI between 2003 and 2012. Using a factor analysis of the cocitation data, the intellectual structure of nursing leadership research was mapped, and the results suggest that contemporary nursing leadership research is organized according to different concentrations of interest: work environment, evidence into practice, communication, emotional intelligence, and job satisfaction.

The mapping of the intellectual structure of nursing leadership studies indicated that the field now has its own literature and that it has developed into a legitimate academic field. The publication of nursing leadership-specific journals, such as the *Journal of Nursing Administration*, *Journal of Advanced Nursing*, and *Journal of Nursing Management*, indicates that nursing leadership has gained the status required for an independent research field. Because the nursing leadership field is still new and the analysis has shown that it has an evolving structure, it is believed that nursing leadership publication outlets will gain the popularity and prestige that is required to become a more prominent academic field when the current paradigms and key research themes in nursing leadership studies, how they interrelate, and what they represent have been identified. As the number of scholars and resources contributing to nursing leadership increases, the academic environment conducive for the cross-fertilization of research ideas will be formed and nursing leadership as a research field will gain more momentum for further development.

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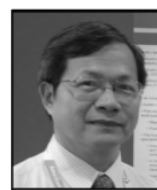
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