

Contribution of Different Disciplines to Service Innovation: A Keyword Analysis

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Abstract

The main purpose of this paper is to analyze how many disciplines and which disciplines contribute more to emerging 'service innovation' discipline. In this study, bibliometric techniques of keyword analysis were used to trace the contribution of different disciplines to 'service innovation' discipline. A five step procedures were followed for the determination of disciplines which are contributing to "service innovation" discipline. Initially, a search was conducted in Web of Science database for retrieving 'service innovation' research papers. Secondly, a total of 545 papers were retrieved and 245 journal papers were chosen for analysis. In the next step, 1,217 citing documents and 1,602 cited by documents were determined. The fourth phase was the analysis and standardization of keywords in 'citing documents' and 'cited by documents'. Final step was determination and standardization of discipline names. The discipline names were checked by an expert and academic in service science. In this step, we considered the discipline names which occurred at least 4 times in 'citing documents' and 'cited by documents' and finalized 31 discipline names in 'citing documents' and 28 discipline names in 'cited by document'. The results show that there are similarities of disciplines for contribution to 'service innovation' in both 'citing documents' and 'cited by documents'. The findings also yields that 'social equity', 'social capital', 'intellectual capital', and 'service supply chain' are also contributing to 'service innovation'. So, service innovation scientists or service science scientists should give considerations to those disciplines.

Keywords

service innovation, keyword analysis, emerging discipline

1. Introduction

Service innovation (SI) is an emerging discipline and has been developed from different disciplines. Service innovation or service science, management and engineering (SSME) are widely recognized as a key driver for the economic growth (Sakata, Sasaki, Akiyama, Sawatani and Shibata, 2011). SI or service science can be thought of as an integration of many areas of study known as service management, service marketing, service operations, service engineering, service computing, service human resources management, service economics and others (Spohrer, Anderson, Pass, Ager and Gruhl, 2008). SI is an emerging interdisciplinary approach that combines fundamental science and engineering theories, models and applications with facets of the management field, particularly knowledge, supply chain and change management, in order to enhance and advance of this emerging service innovation field (Wu and Wu, 2010). Since 1980s, many scholars in innovation management such as, Miles (2000), Sundbo (1997), Gallouj and Weistein (1997), Gallouj (2002), den Hertog, Broesma and van Ark (2003), as well as Tidd and Hull (2003) lay the theoretical foundation of innovation in the service sector. Nowadays, SI has been researched much more frequently than before (Zhu and Guan, 2012) and its contribution to creating economic growth has also been recognized (Coombs and Miles, 2000; Gallouj, 2002). However, Gallouj and Savona (2009), Noor and Pitt (2009), Droege, Hildebrand, and Forcada (2009), as well as Macbeth and de Opacua (2012) critically reviewed the researches in SI. But there are just a few researchers, such as Siddike and Kohda (2013), Zhu and Guan (2012), Lee and Su (2012), Sakata et al. (2011), and Bergmann and Dachs (2003) analyzed the research and productivity in the field of SI. Although SI has been studied more widely than before, and many disciplines are contributing to emerging 'service innovation' discipline, so this study has been conducted in order to explore how many disciplines and which discipline contribute more to emerging 'service innovation' discipline by using bibliometric techniques of 'keyword analysis'.

2. Literature Review

Nowadays, SI has been researched widely (Zhu and Guan, 2012). Scholars from different disciplines are contributing for the development of emerging 'service innovation' disciplines. With the proliferation of research and publications in SI domain, many scholars (Siddike and Kohda, 2013; Zhu and Guan, 2012; Lee and Su, 2012; Sakata et al., 2011, and Bergmann and Dachs, 2003) have been analyzed the research and publication of SI bibliometrically. Bibliometric research is devoted to quantitative studies of literature. It encompasses a number of empirical methods, such as citation and co-citation analyses, co-word analysis, complex network analysis, etc (Ding, Chowdhury, and Foo, 2001; Milojevic, Sugimoto, Yan, and Ding, 2011). Bibliometric studies can be used to trace the development of subject mapping/cartography using author co-citation, and journal co-citation analysis

(Ding, Chowdhury, and Foo, 1999; 2000). Bibliometric studies can also be used for the advancement or development of knowledge on the development of science and technology in relation to social and to policy questions (van Raan, 1997).

Recently Siddike and Kohda (2013) conducted a bibliometric study on service innovation (SI) research in the world and explored the growth and development of research productivity in SI during the period of 2001-2011. They explored the overall growth of SI research, and then investigated the cross-country comparisons in its research performances, with the focus on the world share, relative research effort, impact and the quality of top ten productive countries in the world. They also developed productive institution index, productive author index, and productive journal index in the field of SI. They showed that USA is the leading country and has the biggest share of SI research in the world. Similarly, Zhu and Guan (2012) carried out another bibliometric study of SI research based on complex network analysis by using small world complex network theory. They analyzed scientific research in the field of SI, and discovered its research focuses. They considered the keywords and subject categories of the publications as actors to map keyword co-occurrence network and subject category co-occurrence network, and compared them with their corresponding random binary networks to judge whether these complex networks have the characteristics of small world network, in order to find the hot issues in the field of SI by the small world network analysis. They found that case study, service industry, service quality, market orientation, new product development, and knowledge management were the most popular keywords in the field of SI. They concluded that there were more researchers who did investigation about SI in the category of Business and Economics, Engineering, Public Administration, Operations Research and Management Science, and Computer Science than those in other categories.

Sakata et al. (2011) developed a methodology to determine the structure and geographical distribution of knowledge, as well as to reveal the structure of research collaboration in such an interdisciplinary area as SI by performing journal information analysis, network analysis and visualization. They showed that there are mainly two groups of elements relating to SI. Knowledge in these areas has been growing rapidly in recent years. In particular, the fields of ecosystem and IT and Web are exhibiting a high growth. They also demonstrated that the global network of knowledge is formed around the powerful hub of the US. They showed that the research competencies of Asian countries lags behind that of the US and European Union. They expected that their methodology will be useful in forming policies to promote service innovation. Moreover, they proposed creation of an international collaboration fund. Chuan and Goudarzlou (2010) conducted a bibliometric study of service science for the assessment of institutional and individual research productivity. They assessed the regional, institutional, and individual research productivity in major service journals. They showed the evidence of worldwide contribution to service research, although there is dominance from academicians and institutions in North America and Europe. Other regions of the world, particularly Asia, are increasing in contribution. Bergmann and Dachs (2003) showed that in the last 15 years attention has been primarily focused on technological change in telecommunications, media and software industry and its consequences for the market structure in service sectors. Most of the bibliometric studies on SI show either citation analysis (Cheng, Kumar, Motwani, Reisman, and Madan, 1999; Vincent and Ross, 2000; Polonsky and Whitelaw, 2005) and ranking of technology and innovation management journals (Linton and Embrechts, 2007; Linton, 2006) or network analysis of SI researches (Zhu and Guan, 2012; Lee and Su, 2012; Sakaki et al., 2011; Bergmann and Dachs, 2003) or ranking of the world's top innovation management scholars and universities (Yang and Tao, 2012). So, there is a gap in literature for which disciplines and how many disciplines are contributing more to SI field. To bridge the gap in literature, this study explores how many disciplines and which disciplines contribute more to the emerging field of 'service innovation' by employing bibliometric techniques of 'keyword analysis' in 'citing documents' and 'cited by documents'.

3. Objectives and Methodology

The aim of this study is to find out how many disciplines and which disciplines contribute more to the emerging service innovation (SI) discipline. The more specific objectives of this study are:

- To identify and compare the most occurred keywords in SI field in both 'citing documents' and 'cited by documents'; and
- To find out how many disciplines and which disciplines contribute more to SI discipline by the comparison of keywords of 'citing documents' and 'cited by documents'.

In this study, initially we get a document set which retrieved with the search word "service innovation" in Web of

Science data base. Let's name the retrieved document set A. Now, we can get a new document set which is cited by the documents in set A. It is called 'Citing documents' set and let's name set B. Similarly, we can get another new document set which cites the documents in the document set A. It is called 'Cited by documents' and let's name set C. In this study, by analyzing the keywords from document set B (citing documents) and document set C (cited by documents), we will be able to identify how many disciplines and which disciplines contribute more to 'service innovation' discipline.

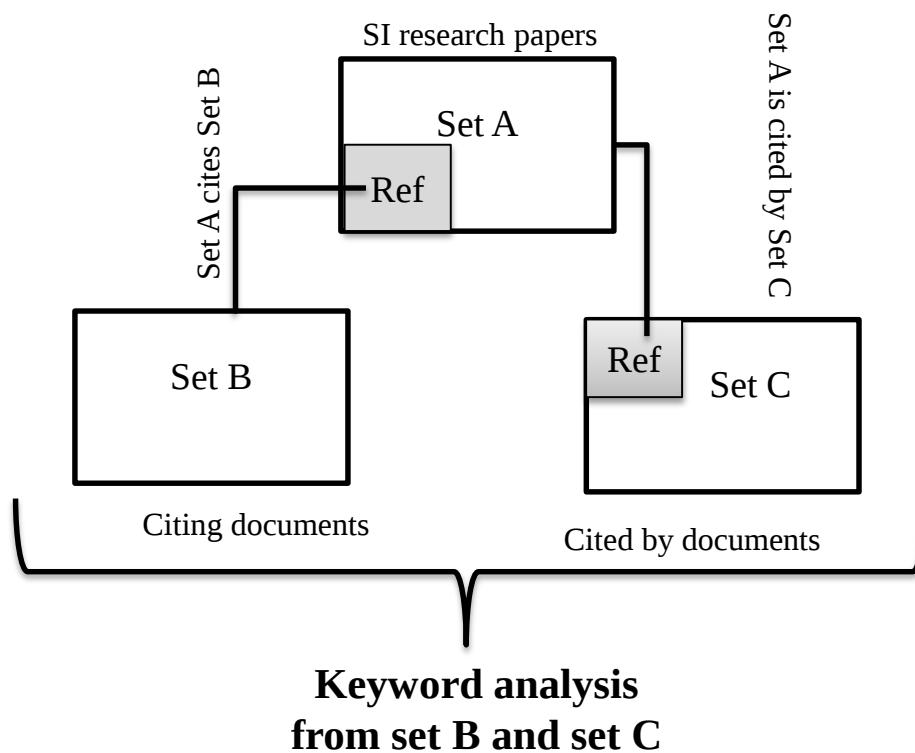


Figure 1: Framework of keyword analysis

A five step procedures were followed for the determination of disciplines which are contributing more to the emerging "service innovation" discipline.

Step 1

Initial step was conduction of search in Web of Science database for retrieving 'service innovation' research papers. The data source for this study is international scholarly publications and citations from the Science Citation Index (SCI) and the Social Sciences Citation Index (SSCI) between 2001 and 2011, compiled by the Thomson Reuters on Web of Science (WoS). Thomson Reuter's Web of Science (WoS) database used for retrieving data for this study. As WoS is one of the main database that is frequently used to rank journals in a discipline in terms of their productivity as well as the total citations received so as to indicate the journals impact, influence or prestige. We conducted search in the WoS database (<http://www.isiwebknowledge.com>) on December 05, 2012. Our search strategy was based on the keyword of the previous study of Lee and Su (2012) as well as Siddike and Kohda (2013). As Lee and Su (2012) standardized a total of 560 keywords and 'innovation' as well as 'service innovation' were the most frequently occurred keywords. So, we conducted search on "service innovation" TOPIC field, i.e., including titles, abstracts, key words and subject categories.

Step 2

In this step, a total of 545 papers were retrieved and 245 journal papers were chosen for analysis. Reviews, letters, editorials, corrections, news, meetings, biographies, and related papers were not incorporated.

Step 3

In the third step, 1,217 citing documents and 1,602 cited by documents were determined.

Step 4

The fourth step was the analysis of keywords in 'citing documents' and 'cited by documents'. In this study, we consider only authors-given keywords. Because, authors-given keywords depict the main ideas of a paper. By analyzing the keywords of 'citing documents', 2,835 keywords occurred 5,167 times. Similarly, 3,287 keywords occurred 7,292 times for 'cited by documents'. In this step, we standardized the keywords by eliminating 'plural forms' to 'singular forms; technique, technologies, technology are standardized to technology. Due to the fact that different words can be used for describing the same concepts, we standardized the words.

Step 5

The fifth step was determination and standardization of discipline names. First, one of the authors determines the discipline names. Then, the discipline names were checked with the consultation of an expert and academic in service science. In this step, we considered the discipline names which occurred at least 4 times in 'citing documents' and 'cited by documents' and finalized 31 discipline names in 'citing documents' and 28 discipline names in 'cited by document'. Figure 2 shows the five step procedures of keyword analysis.

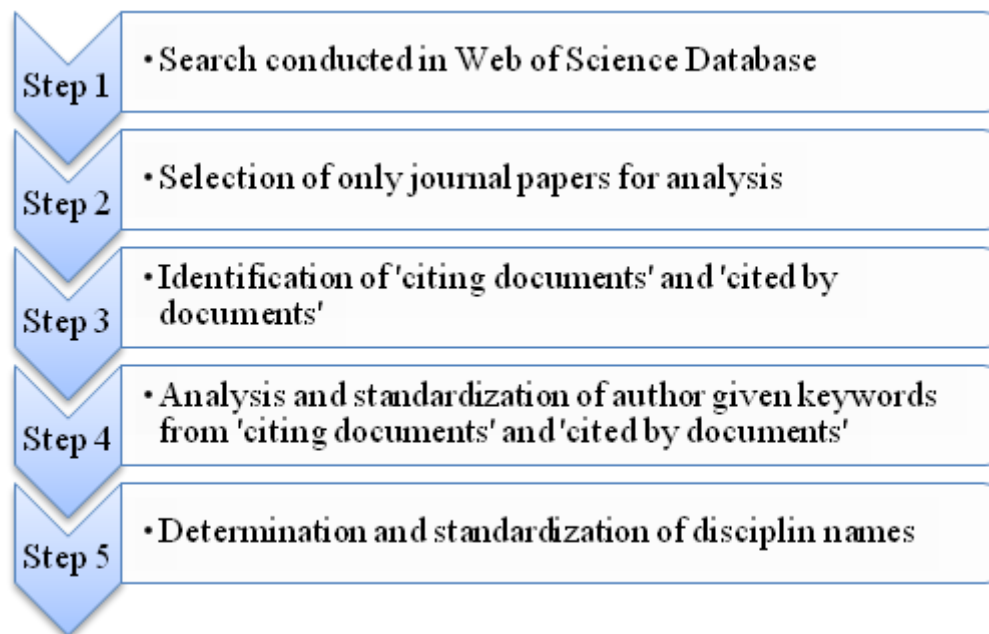


Figure 2: Five steps procedures for keyword analysis

4. Results and Discussions

4.1 Most occurred keywords

In this study 245 journal papers were chosen for analysis. We determined 1,217 citing documents and 1,602 cited by documents. The results of keyword analysis show that 2,835 keywords occurred 5,167 times in 'citing documents' and 3,287 keywords occurred 7,292 times for 'cited by documents'. Table 1 indicates the top 20 keywords in both 'citing documents' and 'cited by documents' ranked by their degree of occurrences. Comparing the degree of occurrences of keywords in 'citing documents' and 'cited by documents', we can see that there is a positive relationship between the keywords of both group of documents. When a keyword was involved in one more paper, the other keywords appeared in the same paper together with it would be more than before (Zhu and Guan, 2012). The number of the neighbors of the keyword increased, and then the degree of it became higher. So the degree can measure the relationship between a keyword and others, and basically reflect the number of papers with which it was involved in the field of 'service innovation'.

From the comparison between 'citing documents' and 'cited by documents' in Table 1, we can discover that besides innovation and service innovation, service, service science, service-dominant logic, knowledge management, service industry, new service development, new product development, customer satisfaction,

co-creation, value co-creation, technology, health care, market orientation, service system, service quality, case studies, literature review, etc. had high degree and were associated to high number of papers. It can be concluded that the service innovation studies focused on these aspects of topics. Most of the companies discussed in the service innovation field are service companies. Many companies came into being service industry. So it is easy to understand service industry was a research priority in the field of service innovation. Many researches on service innovation were case studies and reviews, so the keywords ‘case study’ and ‘literature review’ were mentioned many times. Service innovation was accompanied with product innovation, so new product development was a hot topic for new service development. The success of service innovation was reflected in market effect and service quality, so the development process of service was market oriented.

Table 1: Most occurred 20 keywords in SI research

Citing Documents (1,217)		Cited by Documents (1,602)	
Keywords (2,835)	Occurrences (5,167)	Keywords (3,287)	Occurrences (7,292)
Innovation	262	Innovation	338
Service	131	Service innovation	185
Service innovation	71	Service	130
Service-Dominant Logic	44	Service science	73
Knowledge management	43	Knowledge management	49
Service science	40	Performance	39
Knowledge intensive business services	28	Service industry	39
Innovation systems	26	Service-Dominant Logic	36
New product development	23	New service development	33
Technology	22	Customer satisfaction	27
New product innovation	20	Knowledge intensive business services (KIBS)	26
Co-creation	19	Service quality	26
Health care	19	Service systems	26
Information systems	19	United Kingdom	26
Information technology	17	Strategies	24
Market orientation	17	Literature review	23
Organizational innovation	17	Entrepreneurship	22
Product development	17	Market orientation	22
Case studies	16	Technology	22
Customer satisfaction	15	Open innovation	21
Entrepreneurship	15	Service delivery innovation	21
Product innovation	15	Co-creation	20
Value co-creation	15	Partner match	20
Customer	13	Value co-creation	20
Knowledge	13	Marketing	19
New service development	13	Business model	18
Service system	13	Co-production	18
Value creation	13	Intellectual capital	18
Collaboration	12	Innovation orientation	17
Design	12	Internationalization	17

4.2 Discipline names

Table 2 shows the ‘discipline names’ from ‘citing documents’ and ‘cited by documents’. We consider the discipline names which occur at least 4 times in both ‘citing documents’ and ‘cited documents’. We finalized 31 discipline names in ‘citing documents’ and 28 discipline names in ‘cited by document’. The discipline names were checked by an expert and academic in service science. The results show that there are similarities of disciplines for contribution to ‘service innovation’ in both ‘citing documents’ and ‘cited documents’ and ‘service science’, ‘health science’, ‘information technology’, ‘tourism’, ‘manufacturing’, ‘retailing’, ‘economics’, ‘banking’, and ‘small to medium-sized enterprises (SMEs)’ disciplines are contributing more to ‘service innovation’ discipline. The findings from the list of ‘cited by documents’ also yields that ‘social equity’, ‘social capital’, ‘intellectual capital’, and ‘service supply chain’ are also contributing to ‘service innovation’ discipline.

Table 2: Discipline names (At least 4 times occurred)

Citing Documents		Cited by Documents	
Disciplines	Occurrences	Disciplines	Occurrences
Service science	40	Service science	73
Manufacturing industry	20	Service industry	39
Health care	19	Manufacturing industry	30
Information technology	17	Information technology	17
Entrepreneurship	15	Financial services	13
Small to medium-sized enterprises	12	Health care	13
Tourism	12	Small to medium-sized enterprises	13
Social equity	11	Tourism	13
Governance	10	Telemedicine	8
Telecare	10	Banking	8
Intellectual capital	8	Primary health care	7
Nursing	8	Retailing	6
Primary health care	8	Service Engineering	6
Telemedicine	8	Service entrepreneurship	6
Public service	7	Thalassaemia	6
Web 2.0	7	Web 2 0	6
Financial services	6	Consultancy services	5
Mental health	6	e-health	5
Retailing	6	Health services	5
ServiceI supply chain	6	Nursing	5
Tele dermatology	6	Service Management	5
Thalassaemia	6	Services marketing	5
Care	5	Telecare	5
e-health	5	Tele dermatology	5
Operations management	5	Telehealth	5
Service engineering	5	Information technology	17
Service management	5	Economies	4
Service marketing	5	Hotel industry	4
Service operations	5		
Social capital	5		
Banking	4		

Figure 3 shows the disciplines that contribute to the field of service innovation. $\alpha=B^* \cap C^*$ indicates that service science, health science, information technology, tourism, manufacturing industry, economics, and retailing are the common disciplines which are contributing more to emerging ‘service innovation’. It is noted that scholars from both sets are very interested in emerging ‘service innovation’ field. β shows the disciplines which are derived from B^*-C^* and γ reveals the disciplines which are derived C^*-B^* . So, β indicates that entrepreneurship, social equity, social capital, governance, public service, intellectual capital, and operations management disciplines are

also contributing to ‘service innovation’ discipline. It is noticed that the researchers from this group has broaden their ideas to these (entrepreneurship, social equity, social capital, governance, public service, intellectual capital, operations management) disciplines towards ‘service innovation’. So, the scholars of ‘service innovation’ should give consideration to the disciplines in β . On the other hand, $\gamma = C^* - B^*$ shows that ‘consultancy service’ discipline is also contributing to emerging ‘service innovation’ field.

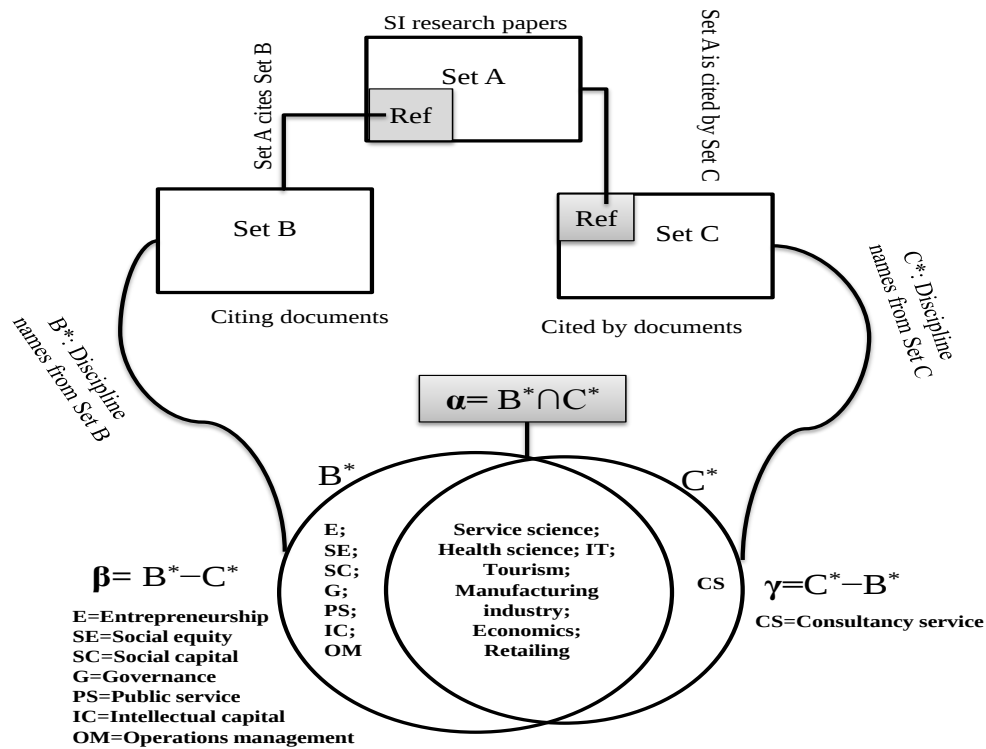


Figure 3: Disciplines that contribute to service innovation

5. Conclusion

Nowadays, more and more scholars are interested to the emerging ‘service innovation’ field. The main purpose of this paper was to identify how many disciplines and which disciplines contribute more to ‘service innovation’ discipline. The results show that there are similarities of disciplines for contribution to ‘service innovation’ in both ‘citing documents’ and ‘cited by documents’, and ‘service science’, ‘health science’, ‘information technology’, ‘tourism’, ‘manufacturing’, ‘retailing’, ‘economics’, ‘banking’, and ‘small to medium-sized enterprises (SMEs)’ disciplines are contributing more to ‘service innovation’. This study also yields that ‘social equity’, ‘social capital’, ‘intellectual capital’, and ‘service supply chain’ disciplines are also contributing to ‘service innovation’ discipline. So, service innovation scientists or service science scientists should give considerations to these disciplines for the betterment of ‘service innovation’ field. To the best of our knowledge, this paper is the first attempt for determination of which disciplines and how many disciplines are contributing more to the emerging ‘service innovation’ discipline based on ‘citing documents’ and ‘cited by documents’. There are several limitations of this study. First, this study is based on the retrieved records from only Web of Science database. So, similar work can be repeated in case of other databases. Second, this study is not free from bias, as the determinations of keywords were done by manually. So, further research should be carried out using computer assisted software.

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