

Oh, Jeesun; Kim, Jeeun

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## Bibliometric analysis on the evolution of knowledge structure of consumer behavior analysis in Telecommunications Policy

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Bibliometric analysis on the evolution of knowledge structure of consumer behavior analysis  
in Telecommunications Policy

**Authors:**

Jeesun Oh<sup>a\*</sup> and Jeeun Kim<sup>b</sup>

*<sup>a</sup>Researcher, K-Industry4.0 Headquarters, Korea Advanced Institute of Science and Technology(KAIST), 291 Daehakro, Yuseong-gu, Daejeon, 34141, Republic of Korea, Tel: 82-42-350-1331 ([jsoh33@kaist.ac.kr](mailto:jsoh33@kaist.ac.kr)), **corresponding author\****

*<sup>b</sup>Senior Researcher, K-Industry4.0 Headquarters, Korea Advanced Institute of Science and Technology(KAIST), 291 Daehakro, Yuseong-gu, Daejeon, 34141, Republic of Korea, Tel: 82-42-350-1332 ([topdogje@kaist.ac.kr](mailto:topdogje@kaist.ac.kr))*

## Bibliometric analysis on the evolution of knowledge structure of consumer behavior analysis in Telecommunications Policy

This paper aim to conduct a bibliometric analysis on the evolution of knowledge structure of empirical analysis of consumer behaviour in Telecommunications Policy. The related studies on the Telecommunications Policy, the academic journal specialized in communication industry and service research, have been conducted relatively recently to review the last 40 years. No research has been conducted on a specific topic including consumer behaviour in the journal. The research results are as follows. First, empirical analysis on consumer behavior has been growing quantitatively, but the article concentration on the 10 sample countries has also strengthened in the journal for the last 10 years. Second, there were differences in research themes and methods by periods and countries. Third, the number of citations in the empirical analysis was relatively higher than that of the all articles, but the citations were commonly concentrated in the top 10 countries. Finally, in the "Telecommunications Policy," the citation rate of empirical analysis paper is high. The "Telecommunications Policy" is cited the most because "Telecommunications Policy" has a long history and the journal covering multidisciplinary and international subject in the economy and society related ICT.

Keyword: Bibliometric analysis; Knowledge structure; Empirical analysis; consumer behavior

## 1. Introduction

An empirical approach to consumer behavior is a common research method in identifying and understanding the underlying mechanisms of the telecommunication market and policy. It is meaningful in the theoretical and practical aspects to analyze the research trends and changes of topics and citations in the empirical studies related to consumer attitudes and decisions on telecommunication services (Choi et al., 2012; Leydesdorff, 2001). It is possible to grasp the intelligent developments varying according to the period and compare the research concentration and distribution by country or researchers. In addition, it is also possible to identify the diffusion effects of knowledge and research networks among countries or researchers, through co-author analysis.

The related studies on the Telecommunication Policy, the academic journal specialized in communication industry and service research, have been conducted relatively recently to review the last 40 years (e.g., Gómez-Barroso et al., 2017; Kwon and Kwon, 2017). However, no research has been conducted on a specific topic including consumer behavior in the journal. We therefore aim to conduct a bibliometric analysis on the evolution of knowledge structure of empirical analysis of consumer behavior in Telecommunications Policy, establishing the following research questions.

- Research question 1: How do the research topics and citations of the empirical analysis of consumer behavior in the journal change over time?
- Research question 2: Do the topics and citations of the empirical analysis differ between some countries that have published many articles in the journal?

## 2. Research process and methodology

To answer the research questions, we performed the research process as shown in Fig. 1. In stage 1, we gathered the bibliographic information from articles in which empirical analysis were conducted on the data collected from the consumer survey in the journal of Telecommunications policy through the scholarly database of Scopus (<https://www.scopus.com>). The keywords are “variable” OR “questionnaire” OR “empirical” and choose “all fields.” At the next stage, the source title choice is “telecommunications policy.”

### 3. Research Result

Among the total journal 1,936 papers (in Telecommunications policy), there are 94 papers on empirical analysis. When narrowed only to articles, there are 511. Document type only includes “Article” except editorial material, letter, review, note, and conference paper.

<Table 1> Analyze by Period

	<b>1<sup>st</sup> period</b>	<b>2<sup>nd</sup> period</b>	<b>3<sup>rd</sup> period</b>	<b>Total</b>
	<b>~ 1997</b>	<b>1998 ~ 2007</b>	<b>2008 ~ 2017</b>	
Targeted Journal	18	14	62	94
Total	907	357	672	1,936
Ratio (%)	1.9%	3.9%	9.2%	4.9%

The total of “Telecommunications Policy” journals consists of 1,936 publications, of which 94 are based on empirical analysis (based on questionnaire). The number of papers published in the Telecommunications Policy from 1978 to 1997 (1<sup>st</sup> period) was 907, and the number of empirical analysis papers was 18 (1.9%). The number of paper published 1998~2007 (2<sup>nd</sup> period) was 357, and the number of empirical analysis paper was 14 (3.9%). The number of paper published 2008~2017 (3<sup>rd</sup> period) was 672, and the number of empirical analysis paper was 62 (9.2%). The ratio of empirical analysis articles found to be increasing.

<Table 2> Analyze by National

	<b>Nation</b>	<b>Targeted</b>	<b>*Ratio</b>	<b>Total</b>	<b>**Ratio</b>	<b>***Ratio</b>
1.	United state	19	20.2%	556	28.7%	3.4%
2.	Korea	13	13.8%	87	4.5%	14.9%
3.	Japan	9	9.6%	46	2.4%	19.6%
4.	Germany	7	7.4%	92	4.8%	7.6%
5.	England	6	6.4%	189	9.8%	3.2%
6.	Finland	4	4.3%	22	1.1%	18.2%
7.	Italy	4	4.3%	51	2.6%	7.8%
8.	Spain	4	4.3%	44	2.3%	9.1%

9.	Taiwan	4	4.3%	25	1.3%	16%
10.	Australia	3	3.2%	54	2.8%	5.6%
11.	Turkey	3	3.2%	13	0.7%	23.1%

\* Targeted Ratio: targeted journals (empirical analysis journal: 94) by nation/Total targeted journals

\*\* Total Ratio: total journals by nation/total journals

\*\*\* Ratio: targeted journals by nation/total journals by nation

The analysis results by country are as follows. The United States accounts for a large portion of the total papers and empirical analysis. Korea ranking is 2<sup>nd</sup>, Japan ranking is 3<sup>rd</sup>, and Germany is 4<sup>th</sup>. Korea has a high percentage of total empirical analysis papers (13.8%). The United Kingdom and the United States have the lowest rate of empirical analysis to total journals by nation. The number of papers in other countries: Netherlands is 53, Canada is 54, Spain is 43, China is 43, and France is 39. In the case of the above countries, the total number of empirical study is one or two; not much empirical analysis is done.

<Table 3> Number of cited articles

	1 <sup>st</sup> Period	2 <sup>nd</sup> Period	3 <sup>rd</sup> Period	Total	Targeted Journal	Cited Ratio
	~ 1997	1998 ~ 2007	2008~2017			
Targeted Journal	17	109	904	1,066	94	11.3%
Total	916	1,344	4,909	7,169	1,936	3.7%
Ratio(%)	1.9%	8.1%	19.1%	14.8%		

There are 1,936 out of 7,169 papers that cite the entire journal of “Telecommunications Policy” and the citation rate is 3.7%. There are 94 journals citing the empirical analysis paper out of 1,066, and the citation ratio is 11.3%. The citation rate of the empirical analysis paper is more than three times higher. From 1978 to 1997, the 1<sup>st</sup> period, 916 papers were cited and 17 papers were cited for empirical analysis (1.8%), from 1998 to 2007, the 2<sup>nd</sup> period, 1,344 articles were cited and 109 articles were cited for empirical analysis (8.1%), from 2008 to 2017, the 3<sup>rd</sup> period, 4,909 articles were cited and 904 articles were cited for empirical analysis (19.1%). The number of papers citing the “Telecommunications Policy” from 2008 to 2017 (3rd period) is the largest in the total number of papers and empirical analysis papers. In recent years, varieties of empirical analysis research methodologies have been developed. A citation rate of empirical analysis paper is increasing.

<Table 4> Number of cited articles (National)

	<b>Nation</b>	<b>Target</b>	<b>*Ratio</b>	<b>Total</b>	<b>**Ratio</b>	<b>***Ratio</b>
1.	United States	181	17.0%	2001	27.9%	9.0%
2.	Korea	132	12.4%	490	6.8%	26.9%
3.	Taiwan	109	10.2%	298	4.2%	36.6%
4.	China	82	7.7%	431	6.0%	19.0%
5.	India	82	7.7%	249	3.5%	32.9%
6.	Spain	68	6.4%	278	3.9%	24.5%
7.	UK	67	6.3%	763	10.6%	8.8%
8.	Malaysia	51	4.8%	142	2.0%	35.9%
9.	Australia	36	3.4%	353	4.9%	10.2%
10.	Germany	36	3.4%	294	4.1%	12.2%
11.	Finland	32	3.0%	153	2.1%	20.9%
12.	Iran	31	2.9%	92	1.3%	33.7%
13.	Canada	28	2.6%	214	3.0%	13.1%
14.	Hong Kong	28	2.6%	102	1.4%	27.5%
15.	Japan	26	2.4%	105	1.5%	24.8%

\* Targeted Ratio: targeted journals by nation/Total targeted journals

\*\* Total Ratio: total journals by nation/total journals

\*\*\* Ratio: targeted journals by nation/total journals by nation

The United States has the most cited empirical study papers, but the citation rate is not too high. Korea has 2<sup>nd</sup> ranking in total number of cited papers. Korea is active in research based on empirical analysis. Taiwan, India, Malaysia, Korea, and Iran have high ratio of empirical studies to national papers.

UK has the lowest rate of empirical analysis. Qualitative research ratio is higher than empirical analysis.

<Table 5> Journal of cited by Telecommunications Policy

	<b>Journal</b>	<b>Targeted</b>	<b>*Ratio</b>	<b>Total</b>	<b>**Ratio</b>
1.	Telecommunications Policy	107	10.0%	1010	14.1%
2.	Telematics And Informatics	38	3.6%	162	2.3%

3.	International Journal Of Mobile Communications	29	2.7%	57	0.8%
4.	Technological Forecasting And Social Change	23	2.2%	100	1.4%
5.	Computers In Human Behavior	22	2.1%	44	0.6%
6.	Info	17	1.6%	137	1.9%
7.	Expert Systems With Applications	16	1.5%	34	0.5%
8.	Journal Of Retailing And Consumer Services	12	1.1%	13	0.2%
9.	Service Business	11	1.0%	15	0.2%
10.	Information Economics And Policy	10	0.9%	119	1.7%
11.	International Journal Of Bank Marketing	9	0.8%	11	0.2%
12.	Marketing Intelligence And Planning	9	0.8%	11	0.2%
13.	New Media And Society	9	0.8%	44	0.6%

\* Target Journals Ratio: cited target journals/Total targeted journals

\*\* Total Ratio: total cited journals/total journals

The Telecommunications Policy cites itself as the largest and the most comprehensive journal. In particular, the journals that cite many papers on empirical analysis of the total thesis are "Telematics and Informatics (2<sup>nd</sup>-ranking)" and "International Journal of Mobile Communications (3<sup>rd</sup>-ranking)." Especially, "Information Economics and Policy" cites more qualitative research than empirical analysis. The total citation rate is relatively high, but the empirical research citation rate is low.

<Table 6> Keywords (targeted journal)

	<b>1<sup>st</sup> Period</b>	<b>*Ratio</b>	<b>2<sup>nd</sup> Period</b>	<b>**Ratio</b>	<b>3<sup>rd</sup> Period</b>	<b>***Ratio</b>	<b>Total</b>
	<b>~1997 (18)</b>		<b>1998~2007 (14)</b>		<b>2008~2017 (62)</b>		
Telecommunications service	4	6.5%	9	64.3%	18	100%	30
Internet	0	-	7	50.0%	11	61.1%	18
Mobile	2	3.2%	4	28.6%	27	150%	33
Public Policy	3	4.8%	8	57.1%	4	22.2%	13



Telephone set	1	1.6%	0	-	10	55.6%	12
Marketing	2	3.2%	4	28.6%	6	33.3%	11
Surveys	1	1.6%	0	-	8	44.4%	10
Competition	-	-	0	-	8	44.4%	9
Sales	-	-	0	-	8	44.4%	8
Customer satisfaction	-	-	7	50.0%	11	61.1%	8
Broadband	-	-	6	42.9%	-	-	8
Commerce	-	-	-	-	7	38.9%	7

\* Ratio: 1st period targeted journals/1<sup>st</sup> period total targeted journals (18)

\*\* Ratio: 2<sup>nd</sup> period targeted journals/2<sup>nd</sup> total targeted journals (14)

\*\*\* Ratio: 3<sup>rd</sup> period targeted journals/3<sup>rd</sup> total targeted journals (62)

The 1st and 2nd periods have the highest number of "Telecommunications service" keywords. Because there are many papers analyzed by telephone subscriber database. In the 3rd period, "Mobile" is the most. The second is "Telecommunications service," the third is "Internet" and "Customer satisfaction." Since the late 1990s, mobile and internet subscribers have been increasing, and there have been a lot of studies on the acceptance of consumers, design of telecommunication pricing, mobile pricing, and satisfaction rate of customer service related to telecommunication services.

<Table 7> Keywords (targeted journal/Comparison of United States, Korea, and Japan)

	<b>USA(19)</b>	<b>*Ratio</b>	<b>Korea(13)</b>	<b>**Ratio</b>	<b>Japan(9)</b>	<b>***Ratio</b>
Telecommunications service	6	31.6%	3	23.1%	4	44.4%
Internet	4	21.1%	4	30.8%	3	33.3%
Mobile	7	36.8%	7	53.8%	7	77.8%
Public Policy	7	36.8%	3	23.1%	-	-
Telephone set	4	21.1%	4	30.8%	4	44.4
Marketing	1	5.3%	1	7.7%	3	33.3
Surveys	2	10.5%	1	7.7%	3	33.3
Competition	1	5.3%	1	7.7%	-	-

Sales	1	5.3%	1	7.7%	-	-
Customer satisfaction	7	36.8%	6	46.2%	2	22.2%
Information technology	3	15.8%	1	7.7%	-	-
Mathematical model	3	15.8%	4	30.8%	-	-
Broadband	4	21.1%	-	-	-	-

\* Ratio: targeted journals of USA/total targeted journals of USA (19)

\*\* Ratio: targeted journals of Korea/total targeted journals of Korea (13)

\*\*\* Ratio: targeted journals of Japan/total targeted journals of Japan (9)

In the United States, most of the keywords are evenly distributed. In addition, the many keywords are "Mobile," "Public Policy," and "Customer satisfaction." "Mobile" is the highest in Korea; "Customer satisfaction" is second, then third is the "Telephone set," and lastly, "Internet". "Mobile" is the highest in Japan, too, followed by "Telecommunications service" and "Telephone set." Among the empirical studies, there is no research on "Public Policy" in Japan. Korea has a three. On the other hand, the US has a high percentage of the "public policy." The United States is active in policy research compared to Korea and Japan. In the case of Korea, there are many studies related to mobile and Internet penetration. The ratio of empirical analysis using subscriber database is high. Other keywords are conjoint (4 papers, 30.8%), customer acceptance (3 papers, 23.1%), willingness to pay (3, 23.1%) and internet telephone (2 papers, 15.4%). Most are telecommunication pricing, consumer acceptance, and empirical analysis related keywords. In Korea, empirical analysis research is active.

#### 4. Conclusions

The results of our bibliographic analysis showed the following implications. First, empirical analysis on consumer behavior has been growing quantitatively, but the article concentration on the 10 sample countries has also strengthened in the journal for the last 10 years. "Telecommunication Policy" is increasing in proportion to the number of empirical analysis papers. Various research methodologies, analysis methods, and analysis tools have been developed. In the journal that deals with policy ("telecommunications policy"), in which qualitative research has become mainstream, research through scientific approaches (statistical and economic and mathematical analysis techniques) is increasingly preferred. Second, there were differences in research themes and methods by periods and countries. When we analyzed

the keywords of theses, it was different according to the periods and countries. The United States has the largest number of papers. However, the ratio of empirical analysis papers is the highest in Korea. Korea is active in research on empirical analysis based on the survey.

Third, the number of citations in the empirical analysis was relatively higher than that of the all articles, but the citations were commonly concentrated in the top 10 countries. Finally, in the "Telecommunications Policy," the citation rate of empirical analysis paper is high. The "Telecommunications Policy" is cited the most because "Telecommunications Policy" has a long history and the journal covering multidisciplinary and international subject in the economy and society related ICT. "Telematics and Informatics" ranks second and "International Journal of Mobile Communications" is third; both journals are deal with similar topics.

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