

CHARTING THE GROWTH OF ENTREPRENEURSHIP: A CITATION ANALYSIS OF *FER* CONTENT, 1981-2008

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ABSTRACT

This research analyses the authors, topics and institutions included in *Frontiers of Entrepreneurship Research* and describes the inter-relationships between contributing scholars. This research contributes to the continuing discussions about the nature of entrepreneurship conducted by both entrepreneurship scholars and information scientists. Using bibliometric techniques, this study analyses 3395 items from *FER* and describes the trends in authorship, institutional affiliation and subject focus. This research provides a clearer understanding of where entrepreneurship research takes place, and the topical preferences within entrepreneurship as shown in *FER*. It also highlights the growing contributions of international authors and the nature of collaborative research within the field of entrepreneurship.

INTRODUCTION

Entrepreneurship as an academic discipline is relatively young. The first academic course in entrepreneurship, Management of New Business Ventures, was taught by Myles Mace at Harvard University in 1947. Cruikshank (2008) thoroughly describes the beginnings of entrepreneurship education at Harvard. Since that time, the field has grown exponentially. This paper examines the growth of academic research in entrepreneurship through the lens of *Frontiers of Entrepreneurship Research (FER)*, the conference proceedings of the Babson College Entrepreneurship Research Conference (BCERC), which started in 1981.

This paper examines bibliometric characteristics of all the items published in *FER* between 1981 and 2008. The first volume of *FER* in 1981 included 35 articles; the 2008 volume includes over 200 articles and abstracts. The conference proceedings have grown in both amount of content and authorship. This paper uses bibliometric analysis to examine the changes in authorship, institutional affiliation and subject focus since *FER*'s beginning. The results provide insights into the evolution of entrepreneurship as an academic discipline and present a long view of the demographic, institutional and subject changes in the field over the past three decades.

LITERATURE REVIEW

As an academic discipline, entrepreneurship is relatively young. Since the first class offering in 1947, the field has seen impressive growth. Cooper, Hornaday and Vesper (1997) discuss the early development of the field. Gartner and Vesper (1997) point out that in 1985 there were 253 college courses in entrepreneurship and in 1993 441 courses were available. Katz's (2003) history of entrepreneurship education in the United States estimated that there are "more than 2200 courses at over 1600 colleges." The Princeton Review (2011) listed more than 80 academic programs offering undergraduate majors in entrepreneurship.

As entrepreneurship research has expanded, so has the debate about the scope and meaning of that research. The discussion includes both normative questions about the research (how is research conducted) methodological questions (what methods are used to study entrepreneurship) and disciplinary questions (Is entrepreneurship a distinct discipline, or is it an interdisciplinary field?).

There are a number of articles that explore the intellectual structure of entrepreneurship. Déry and Toulouse (1996) evaluated the social structure of entrepreneurship research using articles from the *Journal of Business Venturing* and compiled a list of the most frequently cited publications. Grégoire, Noël, Déry & Béchar (2006) examined the growth of entrepreneurship as a field and discussed its “disciplinary convergence,” e.g., how strands of parent disciplines converge to form the discipline of entrepreneurship. Reader and Watkins (2006) examined the relationships between 78 entrepreneurship researchers and identified “groups of scholars whose work falls in to similar areas.” They concluded that there are a number of research themes in entrepreneurship and that scholars with similar interests tend to work together closely. Schildt, Zahra &, Sillanpaa, (2006) examined citations from over 700 entrepreneurship articles and identified 25 different research strands in the field, concluding that entrepreneurship would be hindered from developing as a discipline because of this fragmentation in research fronts, and the relationship between entrepreneurship and other disciplines.

In addition to the questions raised by entrepreneurship researchers about the field, information science researchers are interested in entrepreneurship for other reasons. Information scientists concern themselves with how disciplines grow and evolve; one way of viewing that growth is to look at newer research areas and chart their growth and development. The literature discussing the growth of research areas is voluminous and covers the spectrum of social science and science areas. Porter and Rafols (2009) provide an example for research growth in the sciences; Ireland and Webb (2007) explore entrepreneurship research taking place in other disciplines, including accounting, anthropology, political science and psychology.

Bibliometric methods, including co-citation analysis, content analysis, and journal ranking studies, are all used to explore the characteristics of evolving fields of knowledge. Substantial introductions to bibliometric methods can be found in White and McCain (1989) and Borgman and Furner (2002). Morris and van der Meer Martens (2008) discuss the methodological background, while Cassilas & Acedo (2007) provide a specific example of bibliometric evaluation of a single journal title. This research follows in the latter’s tradition, where the content of a single source is analysed as a way of making inferences about patterns of research. It also shares methodological roots with research about the intellectual structure of strategic management research (Ramos-Rodriguez & Ruiz-Navarro, 2004).

The distinction between disciplinary and interdisciplinary research areas is an important one for information scientists. Disciplines, as described by Hearn and Salter (1996), have both a core of knowledge and a means for producing new knowledge. Interdisciplinary subjects draw their knowledge from a core set of disciplines, and may over time develop paradigms and methods that evolve into new disciplinary areas. The disciplines contributing to entrepreneurship include management, sociology, psychology, and economics. Van den Besselar and Heimeriks (2001) examine the varying types of interdisciplinary areas and propose an indicator of interdisciplinarity “based on the patterns and intensity of knowledge streams between research fields.”

METHODOLOGY

The dataset for this project consisted of all items published in *FER* from 1981 to 2008 inclusive - a total of 3395 items. Each volume of *FER* includes a combination of full-length articles, summaries of research and summaries of interactive presentations and poster sessions. Grégoire (2006) describes the growth of *FER* as a research vehicle [expand]. This research follows the method of Quinones-Vidal (2004), and Kirchler and Koch (2006) who studied interdisciplinary growth in the areas of social psychology and economic psychology. Grégoire, Noël, Déry & Bécharde's (2006) co-citation analysis focused on trends in citations in *FER* articles. This research uses data from the articles and summaries as the basis for analysis.

The data collected included information about type of content (article, summary, interactive paper), authorship characteristics (single or multi authored, number of authors), institutional collaboration (single, multiple) and country collaboration (single or multiple). Data were also collected about authors' institutional affiliation (school name, country, state (if US)) and the subject category assigned to each item. Individual author statistics were not collected. Consequently, the number of contributors is known, but the number of distinct authors is not.

After data was entered, there was a fair amount of cleanup before data analysis could begin. Institution names needed to be standardized. In some cases, where the institution was a government agency or other organization, the information about the institution needed to be verified so that the correct country code could be applied. Standardization was also done to subject areas.

Each volume of *FER* is arranged by subject, with between 20 and 30 different subjects covered in each annual volume. Subject names were similar but not necessarily consistent from volume to volume, and not all subjects were included in every volume. The subjects were categorized into twenty-two subject areas that describe the subjects as found in the individual volumes of *FER*. For example, the subjects "corporate entrepreneurship," "corporate ventures," "industry," and "Intrapreneurship" were all assigned to the subject "Corporate Entrepreneurship." Similarly, the subjects "Family," "Family Firms," and "Family Enterprise" were assigned to the subject "Family."

RESULTS

The results show that *FER* has grown tremendously as a vehicle for entrepreneurship research since its initial volume in 1981. The first volume contained 39 articles; the 2008 volume contained 200+ articles and summaries of research. From 1981 to 1984, *FER* only published full-length articles. Starting in 1985, article summaries began to be included, and in 1994 poster sessions or interactive papers were added. All of the papers are presented at BCERC; authors of summaries are given more time to present and there is the expectation that a completed paper will be ready for the conference and for possible inclusion in the proceedings volume. Poster /interactive paper session are shorter with a more informal presentation format and are better suited for research that is in progress, although authors are encouraged to bring a finished manuscript if one is available.

The growth in the amount of content in *FER* by type of presentation is shown in Figure 1. Articles included in *FER* are selected by an editorial board, and, while the number of total items in the proceedings has grown over the years, the number of articles published has remained

consistent. Summaries of research have contributed the most to the increasing number of publications in *FER*. Since 2002, the number of items published in *FER* has ranged between 200 and 235.

Figure 2 shows the proportion of contributions by type of publication. Articles have consistently contributed about 40 items to the proceedings, but their percentage of the total publications in *FER* has dropped as more research summaries numbers increased. Summaries of research have garnered a larger share of the publications since 1992 (averaging near 60%) and are demonstrative of the growth of BCERC as an influential conference. The poster/ interactive category broke above 20% of the conference contributions in 2005.

Authorship Trends

Table 1 shows trends in authorship by quartile. It is clear that collaboration is a key component of research submitted to *FER* – 75% of articles are multi-authored (n=2548). Of the multi-authored submissions, 50% (n=1236) come from authors who work together at the same institution. This is not surprising since colleagues at an institution are more likely to co-author research together. More interesting is that 35% (n=836) of the research is co-written authors at different institutions in the same country, pointing to a cross-fertilization of ideas across institutions. While the percentage in intra-country collaboration has stayed stable across quartiles, the absolute numbers have increased from 63 for the period 1981-1987 to 377 for the period 2002-2008.

Contributions by individual authors were not tracked for this study, so there are no metrics for the number of authors represented in *FER*, only for the number of contributors. According to BCERC guidelines, no author can contribute to more than two items at any given conference. A quick count of the author indexes for 2004-2008 indicated that about 25% of authors contribute 2 papers in any given year. More analysis needs to be done to see whether that trend is consistent over time.

The number of authors per paper has ranged from 1.79 in the 1981-1987 quartile to 2.28 in the 2002-2008 quartile. Since the 1988-1994 period the average number of authors per paper has increased by only 0.09. Papers with single authors account for 25% (n=851) of the total papers, as do papers by three authors (n=838). Contributions by two authors are most prevalent with 42% (n=1410), and works with four or more authors represent 8% (n=296) of the publications.

The most interesting trends from data about multi-authored articles is the growth in collaborations by authors from different countries. Overall, 19% (n=477) items have authors from different countries, but that doesn't reflect growth in inter-country research. From 1981-1987 to 2002-2008 quartiles the numbers of inter-country grew from 4 items to 295, reflecting the increasing internationalization of entrepreneurship research. Table 2 shows the country affiliations of authors submitting to *FER*. Authors from 63 countries have published in *FER*, ranging from 16 countries during 1981-1987 to 55 countries in the period 2002-2008. This increase in international contributions may also be the result of a decision, early in the history of BCERC to hold every third conference overseas, which necessarily increased international submissions.

Institutional Trends

Over the twenty-eight years included in this study, research has been contributed by 942 institutions in 63 countries. Contributions from the United States account for 45% (n=418) of

those institutions; international institutions contributed 55% (n=524). Of those schools providing research, the top 25 US and international schools contributed 40% of *FER* authors; the top 100 schools contributed 71% of authors. Forty percent of all schools (n=378) contributed only one item to *FER*. The top 25 US and international institutions by authors contributing research is shown in Table 3. Table 4 shows the authorship contributions as a percent of total contributors for the top 10, 25, 50 and 100 schools for both the US and internationally. For both sets of schools, the top 100 schools contributed about 70% of the total authors..

Subject Trends

As was mentioned in the methodology section, the subject areas included in *FER* vary yearly. While there is an overlap of topics, the wording used from year to year might vary. The database created for this project included all the variant subject listings, and these were then standardized into 22 different subject areas. Table 4 shows the content categories and frequencies of publication by quartile.

Over the years the focus of contributions has changed. The top five topics overall are entrepreneurial characteristics, startup companies, venture capital, management and corporate entrepreneurship. Management is ranked fourth overall but was included as a top five category in only one quartile – 189 of the 214 items about management occurred in the last two quartiles. Two other topics, strategy and women in entrepreneurship, show marked increases in the last two quartiles, an indication of changes in the research focus within the field.

As a measure of topic diversity, the share of publications contributed by the top five topics per quartile was analysed. The top-five share declined from 70% in the period 1981-1987 to 46% in the period 2002-2008, indicating an increase in topic diversity. The Hirschmann-Herfindahl index – HHI – (Hirschmann, 1964) was also computed as a secondary measure of topic diversity. This index also shows a downward trend from 1188 during 1981-1987 to 691 during 2002-2008, indicating greater diversity of topics (Table 4).

While publication share and HHI show that there is increased diversity in topic in *FER*, several topics were consistently addressed. Two topics, entrepreneurship characteristics and startup companies, were included in top-five topics in each quartile. Venture capital was included in three quartiles, and international aspects and corporate entrepreneurship were included in two quartiles. There are also topics, that while included in *FER* were not a major focus of research. These include bank financing, social entrepreneurship research related to family businesses.

The number of years a subject has been included in *FER* is additional measure of subject diversity. Subject persistence is calculated by dividing the number of years a subject has been included by 28, the total number of *FER* volumes in the sample. Of the 22 topic areas, 15 were included in fewer than 70% of the *FER* volumes. The top five topic most persistently covered (n=number of years included) in *FER* are entrepreneurial characteristics and startup companies (n=27, 96% each), venture capital (n=24, 86%), international aspects (n=23, 82%) and corporate entrepreneurship (n=22, 79%). Only two other topics, women in entrepreneurship (n=21, 75%) and allies (n=20, 71%) were included in more than 70% of the proceedings volumes.

DISCUSSION AND IMPLICATIONS

This research analyzed the content of *Frontiers of Entrepreneurship Research* and provides an explanation of the impact of *FER* in shaping the field of entrepreneurship. It highlights trends in authorship, subject foci and institutional contributions that explain the growth and development

of entrepreneurship as a field over the last thirty years. It demonstrates that collaborative research is the norm within the field of entrepreneurship, including collaboration between researchers in different countries.

Since its beginning in 1981, the Babson College Entrepreneurship Research Conference has positioned itself as a leading conference for disseminating entrepreneurship research. The conference is an interdisciplinary forum for entrepreneurship research, the range of topics included provides a forum for research from many disciplines, including management, finance, and economics.

Results from this research provide some insights about changes to the field over the past three decades. First, it is clear that entrepreneurship is a growing and thriving field. The increase in contributions to FER since 1981 demonstrates steady and continuing interest in entrepreneurship research. The increase in the number of papers presented at BCERC is an indication of the strength of entrepreneurship and a reflection of the importance of research to the continued growth of the field.

Second, it is clear that diversity is an important component of research in *FER*. This is seen in both the range of topics included in the proceedings volumes and increased diversity of topics over time. The increased contributions from international authors is another indicator of diversity.. The conference consistently attracts international authors and the number of international authors, in terms of both the number of countries represented and the absolute number of contributors. Authorship tends to be centered on the United States and Europe, but there are an increasing number of authors from Latin America and Asia.

Finally, while many topics have been explored in *FER* there has been a sustained subject focus on entrepreneurial characteristics, startup companies, venture capital, and management of entrepreneurial ventures. These areas form the nucleus of research for the field and also the core of academic programs. The continued focus on these areas is beneficial for both academic researchers and students by providing cutting-edge research that can then be integrated into a classroom setting.

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Table 1: Authorship Characteristics by Quartile

Article Type:	1981-1987		1988-1994		1995-2001		2002-2008		Total	
	N	%	N	%	N	%	N	%	N	%
Single Author	141	44	166	26	219	23	321	22	847	25
Multiple Author	181	56	474	74	721	77	1172	78	2548	75
Total	322	100	640	100	940	100	1493	100	3395	100
Multiple Author Detail	1981-1987		1988-1994		1995-2001		2002-2008		Total	
	N	%	N	%	N	%	N	%	N	%
Single Institution: Single Country	110	61	277	58	349	48	500	43	1236	49
Multiple Institution: Single Country	62	35	142	30	254	35	377	32	835	33
Multiple Institution: Multiple Country	9	4	55	12	118	16	295	25	477	19
Multiple Author Subtotal	181	100	474	100	721	100	1172	100	2548	100

Table 2: Country Affiliations of Contributors, 1981-2008

	1981-1987	1988-1994	1995-2001	2002-2008	Total
<i>Europe</i>	46	261	611	1395	2313
Austria		2		8	10
Belgium		4	34	107	145
Bulgaria			1	1	2
Croatia				1	1
Czech Republic		1	6		7
Denmark		2	7	14	23
Estonia				1	1
Finland		9	55	82	146
France	1	33	37	57	128
Germany	4	10	26	184	224
Greece			2	3	5
Hungary		2	1	2	5
Iceland				4	4
Ireland	5	4	25	24	58
Italy	1	18	12	30	61
Latvia				1	1
Moldova				2	2
Netherlands	1	2	28	133	164
Norway	2	2	18	52	74
Poland		2	2	14	18
Portugal			1	20	21
Russia				1	1
Slovenia			13	29	42
Spain		7	2	62	71
Sweden	20	39	92	173	324
Switzerland	1	1	3	24	29
Ukraine				2	2
United Kingdon	11	123	246	364	744
<i>Americas</i>	518	1071	1355	1765	4709
Argentina			4	5	9
Brazil	1	2	4	17	24
Canada	61	85	88	149	383
Chile				3	3
Colombia	1		2	1	4
Dominican Republic			1		1
Ecuador				1	1
Mexico			1	6	7
Puerto Rico				2	2
United States	455	984	1255	1580	4274
Uruguay				1	1

Table 2: Country Affiliations of Contributors, 1981-2008

	1981-1987	1988-1994	1995-2001	2002-2008	Total
<i>Australia / New Zealand</i>	7	24	24	107	162
Australia	3	22	24	93	142
New Zealand	4	2		14	20
<i>Asia</i>	1	37	66	125	228
Bangladesh			1	1	2
China		1		16	17
Egypt	1				1
Hong Kong			2	13	15
India		3	1	12	16
Indonesia			1		1
Israel		8	11	29	48
Japan		14	21	7	42
Malaysia			9		9
Philippines			1		1
Pakistan			2		2
Singapore		8	15	21	44
South Korea		1		12	13
Sri Lanka			1	1	2
Thailand		1		4	5
Taiwan		1		6	7
Uzbekistan				2	2
Vietnam			1	1	1
<i>Africa</i>		4	7	7	18
Kenya				1	1
South Africa		4	6	4	14
Tanzania			1		1
Uganda				2	2
Authors by Region:	1981-1987	1988-1994	1995-2001	2002-2008	Total
Europe	46	261	611	1395	2313
Americas	518	1071	1355	1765	4709
Australia / N. Zealand	7	24	24	107	162
Asia	1	37	66	125	229
Africa		4	7	7	18
Unknown	5	5	13	10	33
Totals	577	1402	2076	3409	7464
Countries Represented:					
Europe	9	17	20	27	28
Americas	4	3	7	10	11
Australia / N. Zealand	2	2	1	2	2
Asia	1	8	11	13	18
Africa		1	1	3	4
Totals	16	31	40	55	63

Table 3: Top 25 US and International Institution Contributors

Rank	United States Institutions	International Institutions
1	Babson College	University of Nottingham
2	Rensselaer Polytechnic Institute	Jonkoping International Business School
3	University of Colorado, Boulder	Ghent University
4	University of Minnesota	University of London
5	Baylor University	Helsinki University of Technology
6	University of Illinois at Chicago	Erasmus University Rotterdam
7	University of New Hampshire	INSEAD
8	Georgia Institute of Technology	Swinburne University of Technology
9	Purdue University	Linkoping University
10	Boston University	Imperial College
11	University of North Carolina, Chapel Hill	University of Strathclyde
12	Case Western Reserve University	Queensland University of Technology
13	Georgia State University	Stockholm School of Economics
14	San Diego State University	University of Calgary
15	Temple University	York University
16	University of Pennsylvania	Carleton University
17	University of Georgia	University of Ljubljana
18	Ohio State University	EIM Business and Policy Research
19	University of Southern California	University of Giessen
20	University of Washington	University of Aberdeen
21	University of South Carolina	University of Western Ontario
22	Harvard University	Durham University
23	Utah State University	University of Jyvaskyla
24	Indiana University	University of Southampton
25	University of Central Florida	National University of Singapore

Table 4: Author Contribution Metrics

Number of Institutions	US Contributors	Percent Total	International Contributors	Percent Total
Top 10	1115	26%	771	24%
Top 25	1922	45%	1246	39%
Top 50	2648	62%	1748	55%
Top 100	3400	71%	2284	72%
Total	4272	100%	3190	100%

Table 5: Subject Breakdown of FER Publications by Quartile

	1981-1987	1988-1994	1995-2001	2002-2008	All Years
Allies	4	41	47	97	189
Angel Investors	0	9	18	67	94
Bank Financing	0	0	15	9	24
Corporate					
Entrepreneurship	22+	27	43	111+	203+
Economic Issues	4	8	5	35	52
Education	12	35	23	19	89
Entrepreneurial					
Growth	7	51+	62	53	173
Entrpreneurial					
Characteristics	60+	126+	115+	203+	504+
Equity Financing	0	0	79+	26	105
Family	0	0	12	65	77
General Finance	0	37	21	37	95
Government/ Politics	10	16	38	24	88
International Aspects	32+	45+	34	76	187
Management	4	21	84+	105	214+
Other	0	17	21	0	38
Research	15	19	17	43	94
Social					
Entrepreneurship	4	3	23	22	52
Startup Companies	49+	80+	90+	152+	371+
Strategy	16	15	37	128+	196
Technology	13	29	70+	33	145
Venture Capital	61+	45+	46	117+	269+
Women in					
Entrepreneurship	9	16	40	71	136
Total	322	640	940	1493	3395
Percentage Contribution of the top 5 subjects	69.6%	54.2%	46.6%	47.6%	46.0%
Hirschmann-Herfindal Index	1188.03	897.33	657.03	705.22	690.87

Note: + indicates top 5 subjects within each period.

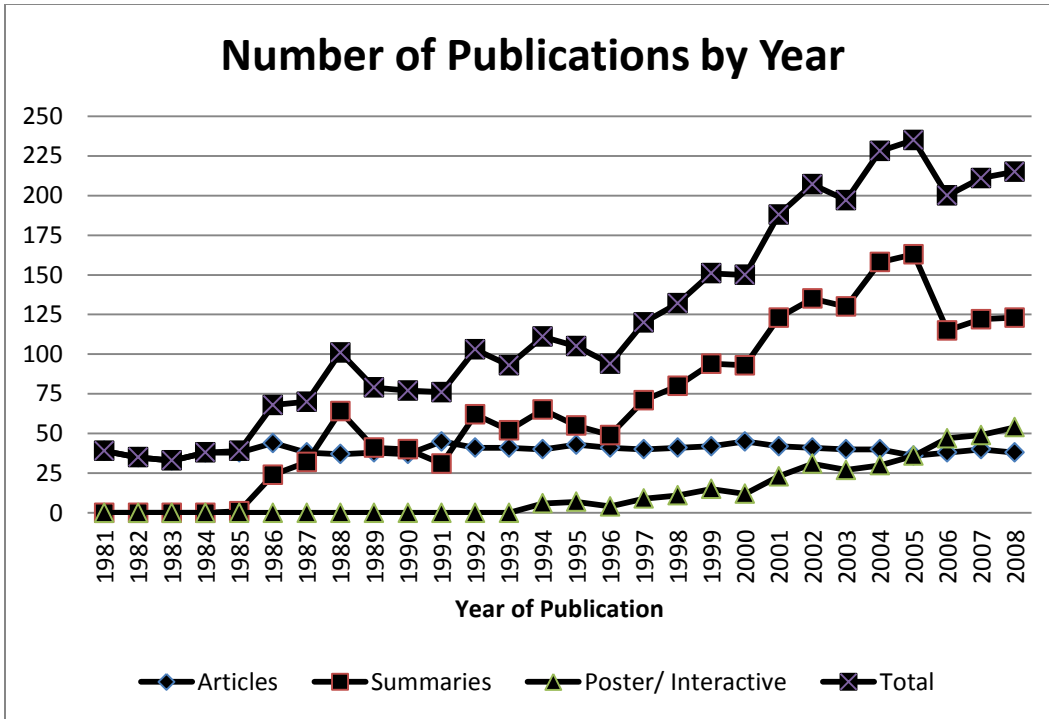


Figure 1

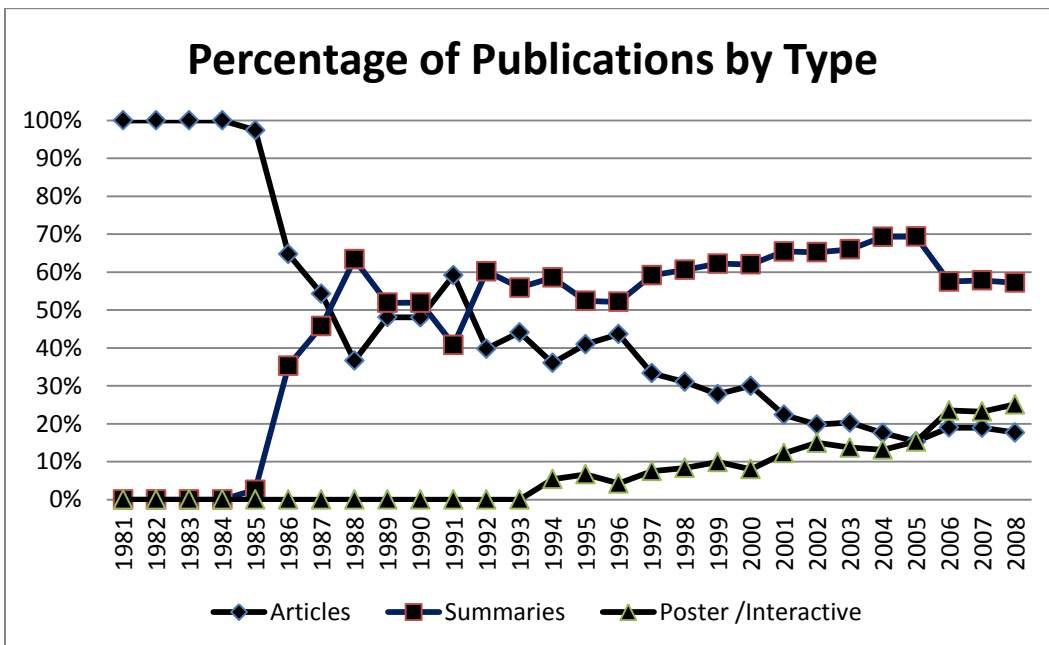


Figure 2