THE BIBLIOMETRIC ANALYSIS OF LITERATURE ON MUSEUM STUDIES

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ABSTRACT:

Museum studies, is the study of museums, museum curation, and how and why museums developed into their institutional role in education and culture through scientific, social, political and other related forces. The purpose of this study is to shed light on the application trends of the international literature related to museum studies on the SCIE, SSCI, and AHCI databases between 1995 and 2014 using a bibliometric technique and citation analysis. The results of this study reveal that influences of the literature related to museum studies on other subject areas continue to expand. Considering the publication of major countries, subject areas, journal and institutions, the results also discussed that the future trend through analysing most cited articles. Moreover, 12 core journal lists are identified by Bradford's law.

1. INTRODUCTION

Academic research is the process of knowledge transfer, accumulation and innovation, while it also motivates and measures the importance of one discipline development. Through its development, the academic research can lift the veil of one discipline dynamics and speculate about the future trend. It also exerts its influence and demonstrates the value of one discipline through the dissemination of scholarly research results. Furthermore, academic spread is the process that scholars in various disciplines communicate through formal and informal dissemination of information. The research results can be presented and be developed chronically in all subject areas with different forms of the published literature. Among published results, papers which have novel and fast-spreading characteristics, is the most important scholarly communication pipeline spread. Providing the most valuable information in the research process, journal articles also help the researchers in forming their academic achievement. Therefore, the development of one discipline can be observed from the journals published literature and publishing research results. And its future trend and evolution also can be explored through spreading of journal articles in various disciplines.

Thus, Canadian Museum of Civilization shares its Research Policy with various museums. It also has set the policy to perform studying and researching to enhance the responsibility and obligation of the museum, which should actively encourage researchers to publish their performances through the exhibition, publishing, electronic media , lectures and other activities (Brandon and Wilson 2005). Whether museum studies can be recognized in the world as a subject area, its professional literature is an issue that measures the significant growth in the museum world and should be obtained more attention (Lorente 2012). The number of published literature is the important measure of the development of one discipline. Increasing related published works is another important phenomenon that shows the booming of museum studies. Especially, the journal articles published in scholarly communication is an important pipeline, and also a measurable standards and quality of a

research disciplines through the evaluation and analysis of relevant research and development.

Bibliometric methods in analyzing academic development have been exited for many years, mainly uses the quantitative and statistical analysis of published literature. It also shows various disciplines characteristics and model of development. Thus, the future trend of one discipline could be forecasted by examining the origins and progress of one discipline.

The explorations of the museum studies literature have seen vigorous development in the last decade owing to the convenience and advancements of museum studies tools. There is little review on museum studies. Some researchers reviewed on family experience on museums (Borun, Cleghom, and Garfield 1995, Dierking 1989, Kropf 1989, Sterry and Beaumont 2006), while (Kawashima 1998) focused on the museum marketing and its impacts. Borun, Cleghom, and Garfield (1995) reviewed family learning through a web survey of art museum educators and a comprehensive literature. Jones (1998) discussed the museums development through bibliometric methods However, computer technology rapidly developed in recent year, especially in 10 years. For example, web 2.0, social networking, cloud computing, smart phones, big data, internet of things, etc will change our experiences on museum. We explored the trends of museum-related studies by means of bibliometric reviews of the literature in the SCIE (Science Citation Index Expanded), SSCI (Social Science Citation Index) and AHCI (Arts and Humanity Citation Index) databases between 1995 and 2014. Standard bibliometric indicators such as the number of papers, number of authors, productivity by country, institutional collaboration, and most cited articles will be analyzed. Moreover, we use the Bradford's law to define the core journal lists on the museum-related studies.

2. DATASET AND METHOD

The dataset used in this study was derived from the SCIE (Science Citation Index Expanded), SSCI (Social Sciences

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Citation Index) and AHCI (Arts & Humanities Citation Index) databases of the Web of Science, created by the Institute for Scientific Information. Thus, this dataset cover science, social science, art and humanity fields. SCIE covers more than 8,500 notable journals encompassing 150 disciplines. Coverage is from the year 1900 to the present day. SSCI covers more than 3,000 journals in social science disciplines. Range of coverage is from the year 1900 to the present day. AHCI covers more than 1,700 arts and humanities journals with 250 major scientific and social sciences journals starting from 1975.

An empirical search command was used by "Topic= ("museum stud*") OR Topic=("Museology") OR Title=("museum*") refined by Document Type= (ARTICLE OR REVIEW OR ART EXHIBIT REVIEW)" to retrieve data related to museum studies. The documents specifically included articles and reviews in the study. Book reviews, papers of the proceeding, letters, notes, and meeting abstracts were not taken into consideration. A total of 8,947 papers published between 1995 and 2014 were found.

Citation analysis is one of important research areas in Bibliometrics. The relationship between literature and the literature of the subject content can be found out through the correlation analysis on the cited information in the literature. One method is to use a direct calculation of total literature citations, as well as calculating the citation of one author's works, or one specific publication, to analyze and evaluate the overall trend

Samuel C. Bradford introduced Bradford's Law in 1934 which is based on a pattern that estimates the exponentiall diminishing returns of extending a search for references in science journals. The principle imposes a formulation that if journals within a field are sorted based on the number of articles into four groups, with each group which is concerned with comprising approximately one-third of all articles, then the number of journals in each group will be proportional to 1:n:n² (Wolfram 2003). Bradford's Law (about scattering of subjects in information sources) is often mentioned together with Zipf's Law (about word frequencies in natural language texts) and Lotka's Law (with regard to the distribution of authors' productivity) as one of the three most important bibliometric laws. These three laws are often considered to be the best models or examples of research resources that are available within the Library and Information Sciences (De Bellis 2009).

3. RESULTS OF BIBLIOMETRIC ANALYSIS

3.1 Overview of Productivity

A total of 8,947 papers related to museum studies were retrieved from the SCIE, SSCI and AHCI databases. Figure 1 shows the number of published papers on the topic of museum studies between 1995 and 2014. According to the numerical data, a large number of research papers published about 2000-2001 have been catalogued in the databases, with distribution rates of 589 (6.58%) and 593 (6.63%) against the total number of papers in 2000 and 2001, respectively. It has also been observed that a declining trend in these numbers appears to have begun from 2001. Figure 2 shows the number of citations of published papers related to museum studies made each year. The figures suggest that the number of these citations has growing. Museum-related articles seem to render volume reduction trend, but in fact has increased the number cited,

indicating that these museum-related articles are widespread to influence the other disciplines.
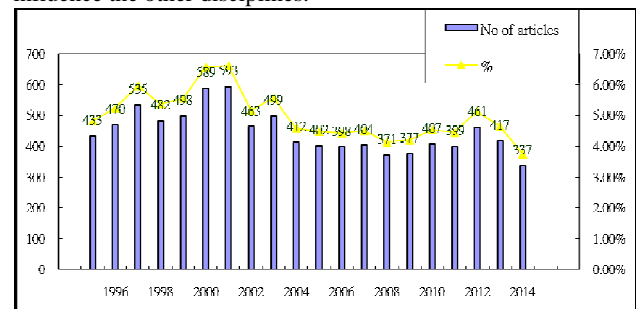

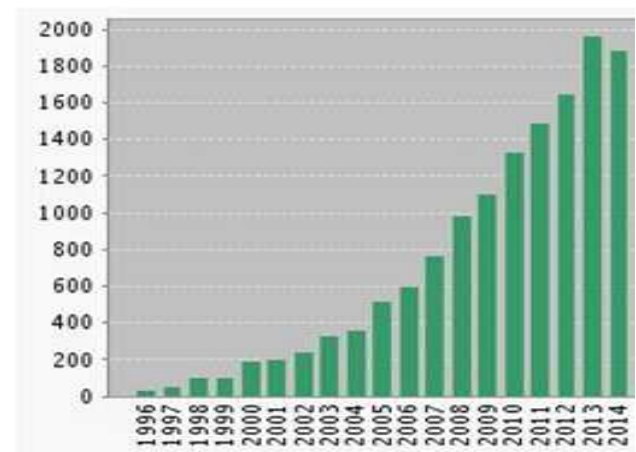Figure 1. Number of published papers from 1995 to 2014.

Figure 2. The annual citations of the published papers (retrieved on Feb. 5, 2015 from Web of Science)

Figure 3 illustrates the ten countries ranked as the top publishers of catalogues in the databases. The figure shows that the USA was the dominant country, followed by England and Germany. In contrast to Figure1, Figure 4 illustrates that the article published in the USA declined until 2008 from the peaked in early 2000, then increased gradually, indicating that the publication trend of USA dominates the overall trend.
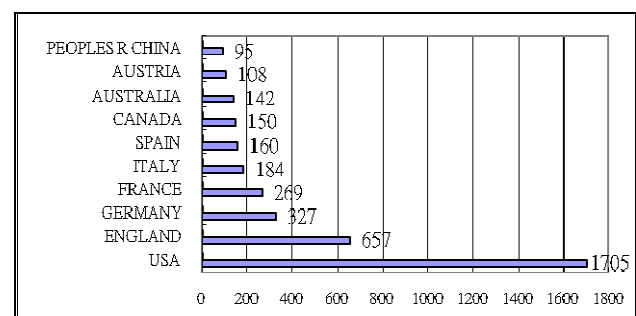

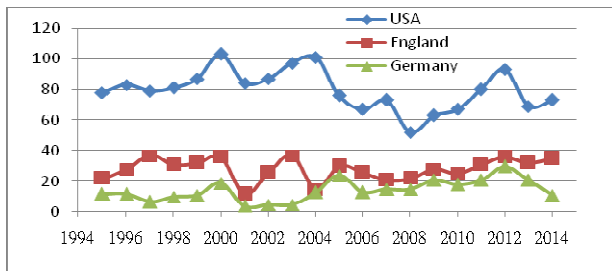Figure 3. The top 10 most productive countries

Figure 4. The yearly publications of top 3 most productive countries

Table 1 presents a more detailed account of the top 10 institutions by which indexed papers were submitted, with the Metropolitan Museum Art, British Museum, Smithsonian Institution as the top 3 most productive institutions. The top 6 institutions The data also show that the corresponding ratios for the institutions in the England are much greater than those in the USA, indicating that the institutions in their countries dominate the academic research in the museum studies field.

Rank	Institution Name	Count	%	Country	% of country
1	Metropolitan Museum Art	81	0.91%	4.75%	USA
2	British Museum	62	0.69%	9.44%	England
3	Smithsonian Inst.	59	0.66%	3.46%	USA
4	Nat. Hist. Museum	52	0.58%	3.05%	USA
5	Victoria Albert Museum	47	0.53%	7.15%	England
6	Museum Natl. Hist. Nat.	44	0.49%	2.58%	USA
7	NYU	37	0.41%	2.17%	USA
8	Harvard Univ.	35	0.39%	2.05%	USA
9	Univ. Calif. Berkeley	35	0.39%	2.05%	USA
10	Univ. Oxford	33	0.37%	5.02%	England

Table 1. Top 10 most productive institutes

Figure 5 provides the top ten subject areas in which museum studies were most widely studied. The most highly ranked subject area was art, with 3621 (approximately 47%) of total, followed by architecture and arts & humanities-other topics related to museum studies.
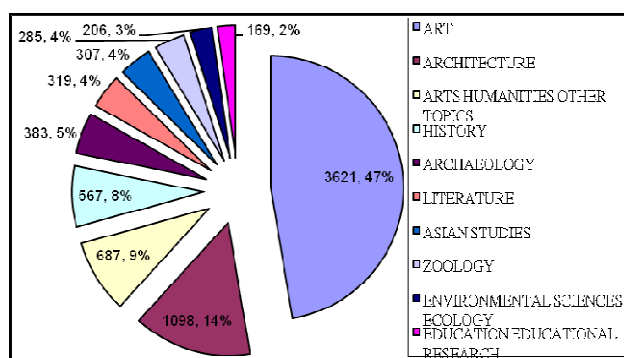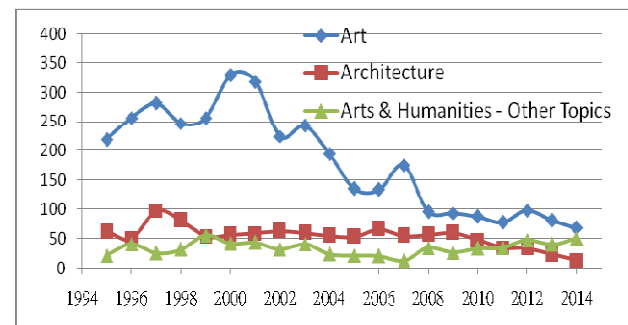

Figure 5: Top 10 subject areas

Figure 6: The yearly publication of top 3 subject areas

Table 2 offers an investigation into the authors who have written more than 18 papers in museum studies during 1995-2014. The most 3 productive authors are Picard, D with 47 written in French, Jodidio, P with 39 in French, Ledes, AE with 35 in English. The data show that the author number in English is more than those in French, while the major subject areas include art and architecture.

Author	articles	Language	Subject Area
Picard, D	47	French	Art
Jodidio, P	39	French	Art
Ledes, AE	35	English	Art
Cash, S	34	English	Art
Gustafson, EH	31	English	Art
Slessor, C	29	English	Architecture
Gaillemin, JL	21	French	Art
Webb, M	20	English	Architecture
Blanc, D	19	French	Art
Lusaka, J	18	English	Art
Mcguire, P	18	English	Architecture

Table 2. The most productive authors

Table 3 shows the 10 articles yielding the most citations. The results revealed that Graham et al. (2004) was an icon in museum studies, with the most citations and highest average citations per year, indicating that it was also the most influential paper. These articles, although not specifically studied on museology itself, but highlight that the museum research will located on the topics about biodiversity, robot tour-guide, museum collections, museum members, species, etc. Among these articles, the two articles especially discussed the robot tour-guiding application on museum (Burgard et al. 1999, Thrun et al. 2000), indicating that the future trend of museum adopting new gadgets .

Articles	TC[1]	ACPY[2]
Graham et al. (2004) New developments in museum-based informatics and applications in biodiversity analysis	377	31.42
Bhattacharya, Rao, and Glynn (1995) Understanding the bond of identification: An investigation of its correlates among art museum members	242	11.52
Moksnes (1995) Egg- morphs and host	175	8.33

	TC	ACPY
preference in the Common Cuckoo (Cuculus canorus): an analysis of cuckoo and host eggs from European museum collections		
Thrun et al. (2000) Probabilistic algorithms and the interactive museum tour-guide robot minerva	**166**	**10.38**
Burgard et al. (1999) Experiences with an interactive museum tour-guide robot	**162**	**9.53**
Wandeler, Hoeck, and Keller (2007) Back to the future: museum specimens in population genetics	**149**	**16.56**
Suarez and Tsutsui (2004) The value of museum collections for research and society	**139**	**11.58**
Ponder et al. (2001) Evaluation of museum collection data for use in biodiversity assessment	**125**	**8.33**
Chown and Gaston (2000) Areas, cradles and museums: the latitudinal gradient in species richness	**120**	**7.50**
Elith and Leathwick (2007) Predicting species distributions from museum and herbarium records using multiresponse models fitted with multivariate adaptive regression splines	**96**	**10.67**

Table 3. The 10 most cited articles (data retrieved on Feb. 5, 2015); [1]TC: times cited; [2]ACPY: average citations per year

3.2 Bradford's Law and journal literature

The 8,947 published papers referred to in this study are distributed among 1703 journals. Appendix provides the number of published papers in each journal and other information ranked by the number of published papers according to the zoning of Bradford's Law. Besides, the number of published papers in the top 11 journals is about one-third of the 2,237 published papers (2,824, 32%). The other 6,123 published papers (68%) are distributed among 1,692 journals, including 1 published paper in each of 931 journals. The results show that the distribution of published papers related to museum is decentralized.

Table 4 provides the ratio comparisons of 3 zones, that is the ratio of published papers in each zone for zones A, B, C is 12 : 122 : 1569. The ratio among the first 3 zones (A, B, C) is almost equal to $11.5 : (11.5)^2 : (11.5)^3$ or $1 : 11.5^1 : (11.5)^2$. In other words, A: B: C is approximated to $1: n: n^2$. The result approximately matches the explanations of Bradford's Law.

zone	(1) No. of journal	(2) No. of articles	(3) Range of No. of articles	(4) Average articles
A	12	2824	123~409	235
B	122	3070	9~103	25
C	1569	3053	1~8	2

Table 4. A brief distribution of the literature

Table 5 specifies 12 leading journals which have published the most research papers related to museum studies according to the data distribution, the papers published in these journals take up to nearly one-third of the total amount. **Artnews** is within the top the list, which has 409 published papers (4.57%) against the

total 8,947 articles. The second journal, **Museum International** (357 papers, 3.99%), has more impact on the times of citation rather than the first. It is also observed that the main subject areas comprised of the 12 listed journals are belonging to Art and Architecture.

Rank	Journal title	count	%	times cited
1	Artnews	409	4.57%	20
2	Museum International	357	3.99%	171
3	Museum News	337	3.77%	78
4	Connaissance Des Arts	326	3.64%	2
5	Arts Of Asia	217	2.43%	5
6	Art In America	215	2.40%	18
7	A+U - Architecture And Urbanism	204	2.28%	0
8	Architectural Review	187	2.09%	4
9	Magazine Antiques	170	1.90%	8
10	Architectural Record	146	1.63%	6
11	Revue Du Louvre-La Revue Des Musees De France	133	1.49%	2
12	Revue Des Musees De France-Revue Du Louvre	123	1.37%	2

Table 5. The 12 core journal titles and their statistics
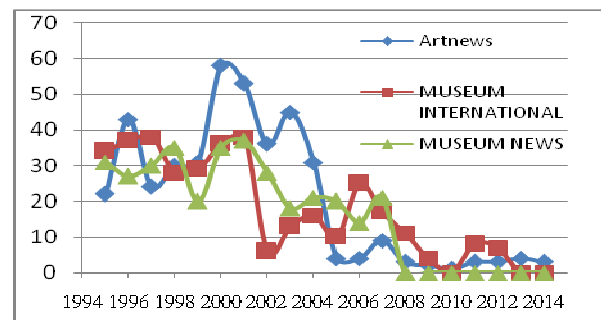
Figure 8: The yearly publication numbers of top 3 journals

Journal title	Times cited	Count
Trends In Ecology & Evolution	646	4
Science Education	369	12
Journal Of Marketing	242	1
Journal Of Cultural Heritage	230	47
Conservation Biology	214	5
Journal Of Zoology	192	1
Studies In Conservation	181	39
Bioscience	174	4
Atmospheric Environment	171	9
Museum International	171	357

Table 6. The top 10 most cited journal titles and their statistics

4. CONCLUSION

This bibliometric study provides an overall picture of articles related to museum published in the databases. We observed a steady growth in the number of papers related to museum between the years of 1995 and 2014. The results are summarized as follows:

1. The literature related to museum studies seems stop to grow, but its citations grow year by year, indicating that its influences spread to other subject areas.

2. The research institutions and the productive output of the main bulk of the affiliation are located in the USA, Britain, Germany, while the most productive institutions are the Metropolitan Museum of Art, the British Museum, and the Smithsonian Institution.

3. The data about top 10 most productive authors shows that author number in English are more than those in French, while the major subject areas include art, architecture and arts & humanities -other topics. The museum-related research will focus on the topics about biodiversity, robot tour-guide, museum collections, museum members, species, etc.

4. According to the Bradford's law, the ratio among the first 3 zones (A, B, C) is approximately equal to $1:11.5^1:(11.5)^2$. Thus, 12 core journal lists in zone A are identified. The top 3 productive journals are ARTNEWS, Museum International, Museum News, but Museum International get more attentions by its cumulated cited times.

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APPENDIX

	No. of articles (1)	No. of journal (2)	Accumulated Journals (3)	(4)= (1)*(2)	(5) = Accumulated (4)
(A) core	409	1	1	409	409
	357	1	2	357	766
	337	1	3	337	1103
	326	1	4	326	1429
	217	1	5	217	1646

	215	1	6	215	1861
	204	1	7	204	2065
	187	1	8	187	2252
	170	1	9	170	2422
	146	1	10	146	2568
	133	1	11	133	2701
	123	1	12	123	2824
(B) relevant	103	2	14	206	3030
	98	1	15	98	3128
	97	1	16	97	3225
	89	1	17	89	3314
	84	1	18	84	3398
	83	1	19	83	3481
	81	1	20	81	3562
	69	1	21	69	3631
	65	1	22	65	3696
	61	2	24	122	3818
	59	1	25	59	3877
	47	3	28	141	4018
	44	1	29	44	4062
	41	3	32	123	4185
	39	1	33	39	4224
	38	1	34	38	4262
	36	4	38	144	4406
	34	2	40	68	4474
	33	1	41	33	4507
	31	2	43	62	4569
	30	1	44	30	4599
	29	1	45	29	4628
	27	4	49	108	4736
	26	1	50	26	4762
	25	3	53	75	4837
	24	2	55	48	4885
	23	1	56	23	4908
	21	1	57	21	4929
	20	1	58	20	4949
	19	3	61	57	5006
	18	6	67	108	5114
	17	5	72	85	5199
	16	4	76	64	5263
	14	4	80	56	5319
	13	3	83	39	5358
	12	14	97	168	5526
	11	12	109	132	5658
	10	11	120	110	5768
	9	14	134	126	5894
(C) marginal	8	20	154	160	6054
	7	20	174	140	6194
	6	43	217	258	6452
	5	64	281	320	6772
	4	65	346	260	7032
	3	132	478	396	7428
	2	294	772	588	8016
	1	931	1703	931	8947