

Research productivity and impact of Library and Information Science in the Web of Science

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ABSTRACT

This study aims to investigate world scientific productivity of LIS researchers, their visibility and impact of their publications. A total of 99789 documents published in 61 LIS journals were extracted from WoS during 1998-2007 and were then analyzed. Based on the results, no significant differences were found among frequencies of LIS publications in different years. The results of Chi-square test clearly proves this finding (χ^2 value=.001, $df=9$, $p>.05$). The growth rate of LIS citations showed that the number of citations has grown more than the number of LIS publications over the period under consideration. The number of citations received by each LIS publication was 0.27 on average. More than 60 percent of all LIS publications and about 40 percent of all citations to LIS were made by US researchers. Computer Science researchers have mostly cited LIS publications in their research. Among all institutions, The Scientist is the most productive institution in LIS. In addition, more than 60 percent of LIS papers were published in Library Journal.

Keywords: Library and Information Science; Research productivity, Citation analysis; Web of Science; Scientometrics

INTRODUCTION

Evaluating scientific productivity and influence of different subject areas, countries, authors, institutions, etc. is one of the goals of scientometric studies. This impact and influence has been assessed through various indicators including number of citations, h-index, and so on. Evaluation and assessment plays an important role in decision and policy making about each area of science and provide useful information about the situation of that area and its strengths and weaknesses. Using quantitative techniques like bibliometrics, different studies have investigated library and information science productivity and impact from various aspects during different periods of time. A recent research by Davarpanah and Aslekia (2008) has analyzed 56 LIS journals indexed in SSCI during the years of 2000–2004. A sample of 894 (10 percent) contributions was chosen for investigation. The results of the study showed that the research output of the authors from USA and UK reaches 70% of the total productivity. Based on the findings, each paper had received 1.6 citations on an average and the LIS researchers had mostly cited latest papers.

Besides this study, Nour (1985) and Kumpulainen (1999) have also investigated world wide LIS productivity during different time periods. Some studies have addressed the situation of LIS productivity in a special country or region of the world (Khan et al. 1998 for LIS in Bangladesh; Cano 1999 for LIS in Spain; Uzun 2002 for LIS in developing and Eastern European countries; Horri 2004 for LIS in Iran; Adkins and Budd 2006 for LIS in United States; Ouyang et al. 2006 for LIS in Taiwan; Yazit 2007 and Yazit and Zainab 2007 for LIS in Malaysia; Huang 2008; Yan, Ying and Zhu 2009 for LIS in China). In terms of citation analysis, Ginn (2003) has conducted citation analysis of authored articles in library and information science research, 2001-2002, and found that citations of articles published in scholarly journals would be greater in number than citations of any other sources. From 2001 to 2003, journal article citations increased both in quantity and percent. Journals were cited most, followed by books, chapters in books, annuals, and web sites. Levitt & Helwall (2007) reported that the levels of citation of 11 of the 20 most highly cited documents in LIS have risen dramatically between 2001 and 2005. Some other research has addressed the issue of interdisciplinary in LIS research (Levitt and Thelwall 2009 Interdisciplinarity of the most highly cited LIS articles; Meyer and Spencer 1996 citation analysis of LIS articles; Rice and Crawford 1992 analysis of citations between communications and LIS; Tang 2004 Visualizing interdisciplinary citations to and from LIS; Odell and Gabbard 2008 The Interdisciplinary Influence of LIS).

Overall, the review of literature on LIS productivity and impact shows that many of which have focused on a special aspect of LIS publications such as citation analysis, interdisciplinary situation, highly cited papers or the publications of a special country or geographic area. Meanwhile, no studies have been done on LIS publications during 1998-2007. Therefore, the present study aims to conduct such a research and show the productivity and impact of LIS research world wide.

RESEARCH OBJECTIVES

This study mainly aims to investigate scientific productivity of worldwide LIS researchers and also the visibility and impact of their publications. In addition, frequency and growth rate of LIS publications and citations, geographical distribution of LIS publications and citations, the most productive institutions and journals, and citing subject areas to LIS publications will be investigated through the present study.

RESEARCH METHODOLOGY

The present study applied survey research method to conduct the study. WoS (Web of Science) database (including all three citation indexes) was used for data gathering. Considering this fact that documents published by the journals indexed in JCR (Journal of Citation Reports) constitute the basis of WoS products, to find all LIS products in WoS, all titles of LIS journals¹ indexed in JCR Social Sciences (2008 edition) were searched in advance search box of database. As a result, 99789 records were found for this search during 1998-2007. To determine the number of publications and citations per year, the most productive countries, institutions and journals, total gathered records were then analyzed. To measure the impact of LIS publications, the number of citations has been

¹ 61 LIS journals are indexed in JCR Social Science in 2008 (APPENDIX 1)

counted for a three-year citation window beginning with the publication year. Chi-square test and exponential regression were used to analyze data statistically.

RESEARCH FINDINGS

LIS Publications and Citations Distribution

An attempt was made to analyze the amount of publications that has been published during 1998–2007. Moreover, the amount of citations was determined per year. Table 1 shows the frequency and percentage of publications and citations in LIS. As shown, the most number of publications belongs to year 2000 in which 10.72 percent of LIS papers were published; In general, no significant difference was found between frequencies of LIS publications in different years; The results of Chi-square test clearly proves this finding (χ^2 value=.001, df=9, $p>.05$). In general, although no ascending or descending trend was found in LIS publications during the ten years, number of publications is declining steadily during the last three years.

The frequency of LIS citations was calculated annually which showed that the most number of citations were given to 2006 publications (14.6 percent). Based on CPP index, those papers published in 2007 had the most impact than other publications (CPP in 2007=.45). Overall, the average number of citations received by each publication was 0.27.

Table 1: Distribution of LIS Publications and Citations

Year	Freq. of Papers	% of Papers	Freq. of Citations	% of Citations	Citation per Paper (CPP)
1998	91610	9.18	1693	6.28	0.18
1999	10600	10.62	1565	5.8	0.15
2000	10699	10.72	1781	6.6	0.17
2001	10359	10.38	2137	7.92	0.21
2002	9890	9.91	2467	9.15	0.25
2003	10560	10.58	2902	10.76	0.27
2004	9893	9.91	3055	11.33	0.31
2005	10102	10.12	3559	13.2	0.35
2006	9982	10	3954	14.66	0.4
2007	8543	8.56	3858	14.3	0.45
Total	99789	100	26971	100	0.27

Self-Citations Distribution

The investigation of the number of self-citations to LIS products showed that about 28 percent of all citations to LIS were self-citations. The percentage of self-citations to citations in LIS per year is shown in Table 2.

LIS Publications and Citations' Growth Rate

The growth rate of LIS publications during examined years was analyzed through which no growth was found. In contrast, the analysis of growth rate of LIS citations showed that the number of citations has grown over the period under consideration. The exponential regression test results have proven that LIS citations had 11.2 percent growth, while the

rate for LIS publications was 0.0 (See Figures 1 and 2). These results were reliable at a confidence level of 95 percent (Sig.=0.001).

Table 2: Distribution of Self-citations to LIS Publications

Year	Freq. of self-citations (SC)	Freq. of citations (C)	% SC/C
1998	10	1693	0.59
1999	3	1565	0.19
2000	201	1781	11.29
2001	724	2137	33.88
2002	856	2467	34.7
2003	1000	2902	34.46
2004	1050	3055	34.37
2005	1062	3559	29.84
2006	1232	3954	31.16
2007	1354	3858	35.1
Total	7492	26971	27.8

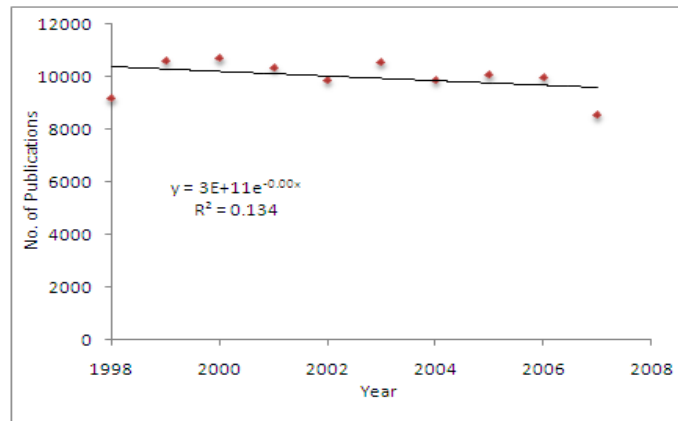


Figure 1: Growth Rate of LIS Publications during 1998-2007

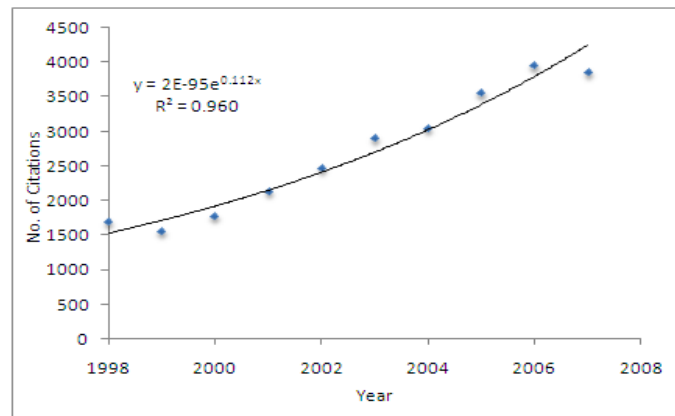


Figure 2: Growth Rate of LIS Citations during 1998-2007

Publishing Countries

All publishing countries and their share of LIS publications were also identified and calculated. Based on the results, 118 countries of the world had publications in LIS (Appendix 2). Among them, USA has published more than 60 percent of total LIS publications during the examined years (Table 3). The proportion of LIS publications to total publications of the most productive countries was also calculated. Based on the findings, LIS publications have constituted about 4 percent of all publications in USA. In general, LIS publications of other countries constitute less than a half percent of all publications. The share of Southeast Asian countries in universal LIS productivity was also investigated. Results shows that compared with the rest of the most productive countries, the impact of the Southeast Asian scientific production is low. The number of Malaysian productivity in LIS (24) placed this country on the 49th world ranking.

Table 3: Frequency and Percentage of LIS Publications in Top 50 Countries

Rank	country	Freq. of Publications	% of Publications	Rank	Country	Freq. of Publications	% of Publications
1	USA	61749	61.88	26	Switzerland	147	0.147
2	UK	3320	3.32	27	Norway	128	0.128
3	Canada	2338	2.34	28	Hungary	106	0.106
4	Germany	811	0.81	29	Greece	103	0.103
5	Australia	622	0.62	30	Ireland	93	0.093
6	Netherlands	519	0.52	31	Austria	91	0.091
7	China	463	0.46	32	Turkey	79	0.079
8	Spain	461	0.46	33	N. Ireland	75	0.075
9	Scotland	455	0.45	34	Slovenia	75	0.075
10	France	397	0.39	35	Russia	69	0.069
11	New Zealand	376	0.37	36	Nigeria	67	0.067
12	South Africa	347	0.34	37	Lithuania	60	0.060
13	Taiwan	314	0.31	38	Mexico	50	0.050
14	South Korea	295	0.29	39	Poland	43	0.043
15	Belgium	289	0.29	40	Iran	41	0.041
16	Italy	273	0.27	41	Thailand	38	0.03
17	India	268	0.26	42	Portugal	37	0.037
18	Singapore	263	0.264	43	Botswana	33	0.033
19	Finland	242	0.243	44	Hong Kong	32	0.032
20	Denmark	222	0.223	45	Croatia	28	0.028
21	Sweden	221	0.222	46	Chile	26	0.026
22	Wales	205	0.205	47	Argentina	25	0.025
23	Japan	202	0.202	48	Egypt	24	0.024
24	Israel	161	0.161	49	Malaysia	24	0.024
25	Brazil	153	0.153	50	Saudi Arabia	24	0.024

Publishing Institutions

The most productive scientific and research institutions in LIS were identified. Based on the results, the researchers of The Scientist institution in Philadelphia has published the most number of papers in LIS. Harvard University has published less than one percent of LIS publications during the examined years. The names of ten top institutions around the world are shown in Table 4.

Table 4: The Most Productive Research Institutions in LIS

Rank	Institution	Location	Freq. of Publications	% of Publications
1	The Scientist Institution	Philadelphia, US	1829	1.83
2	Mitchell Community College	North Carolina, US	1350	1.35
3	Asheville Buncombe Library	Countrywide, US	1322	1.32
4	Harvard University	Massachusetts, US	896	0.90
5	Indiana University	Indiana, US	742	0.74
6	University of Illinois	Illinois, US	533	0.53
7	Pennsylvania State University	Pennsylvania, US	483	0.48
8	California State University	California, US	461	0.46
9	University of Washington	Washington, US	447	0.45
10	University of Wisconsin-Madison	Wisconsin, US	435	0.44

Publishing LIS Journals

As shown in Table 5, Library Journal has published more than 60 percent of LIS publications during the ten years. After that, the Scientist and the American Medical Informatics Association Journals ranked second and third, respectively. The names of ten top journals publishing the most number of LIS publications have been offered in Table 5.

Table 5: Journal which Published the Most Number of LIS Publications

Rank	Source Title	Freq. of Publications	% of Publications
1	Library Journal	60728	60.86
2	Scientist	6547	6.56
3	Journal of the American Medical Informatics Association	2381	2.39
4	Reference & User Services Quarterly	1709	1.71
5	Econtent	1589	1.59
6	Online	1193	1.20
7	Journal of Academic Librarianship	1171	1.17
8	Journal of the American Society for Information Science and Technology	1155	1.16
9	Scientometrics	1109	1.11
10	Electronic Library	1023	1.03

Citing Countries

The citations received by LIS publications were analyzed by country and subject category. Based on the findings, American researchers have most cited LIS publications among researchers from other countries. In other words, More than 40 percent of citations to LIS publications were from USA. Among citing countries, England and Canada came second and third with 2702 and 1484 citations to LIS publications, respectively. Those citing

countries constituting more than 80 percent of citations to LIS publications were gathered (Table 6).

Table 6: Citing Countries to LIS Publications

Citing Country	Freq. of Citations	% of 26971
USA	11864	43.99
UK	2702	10.02
Canada	1484	5.5
China	1482	5.49
Australia	1000	3.71
Netherlands	874	3.24
Germany	855	3.17
Spain	751	2.78
Taiwan	674	2.5
France	271	1
Japan	216	0.8
Scotland	110	0.41
South Korea	101	0.37
Belgium	92	0.34
Denmark	31	0.11
Singapore	31	0.11
Finland	29	0.11
Total	22567	83.67

Citing Fields

As shown in Table 7, LIS publications have been cited mostly by computer science publications. After that, the most number of citations to LIS were received from LIS publications. Management publications were the third most citing publications to LIS.

Table 7: The Subject Area of Citations to LIS Publications

Rank	Subject Area	Freq. of Citations to LIS Publications
1	Computer Science	14509
2	Information Science & Library Science	12176
3	Management	2616
4	Medical Informatics	2001
5	Health Care Sciences & Services	1034
6	Business	945
7	Multidisciplinary Sciences	628
8	Engineering	478
9	Medicine	146
10	Communication	104

DISCUSSION AND CONCLUSION

To sum up, the results of the study showed that 99789 documents were published in LIS during 1998-2007 in WoS. The most number of documents were published in 2000 (10.72%). In general, no significant difference was found between frequencies of LIS publications in different years. The growth rate of LIS citations showed that the number of citations has grown more than the number of LIS publications over the period under consideration. The exponential regression test results proved the fact that LIS citations had 11.2 percent growth, while this rate for LIS publications was 0.0.

While large number of citations is considered to be the evidence of the influence or significance of a work or author, our findings showed that the number of citations received by each publication was 0.27 on average. In addition, about 28 percent of all citations to LIS were self-citations. Davarpanah and Aslekia (2008) also reported that most LIS publications have received few citations.

More than 60 percent of all LIS publications and about 40 percent of all citations to LIS were made by US researchers. Computer Science researchers have mostly cited LIS publications in their research. Tang (2004) also found out Computer Science has held mutual citations with LIS, as more computer science publications are citing and cited by LIS publications. Meyer and Spencer (1996) have also reported that computer science researchers have cited a high proportion of LIS works. During the past decades, LIS field has flourished with the rise of computer technologies. There may be a close connection between LIS and computer science field and that is why, LIS publications are more cited by and citing computer science publications.

Among all institutions over the world, Scientist Institute in Philadelphia is the most productive institution in LIS. It has been observe that all ten most productive research institutions located in United States. Davarpanah and Aslekia (2008) reported that American institutes of LIS plays very crucial role in dissemination of scholarly information in the field of LIS. In addition, more than 60 percent of LIS papers were published in Library Journal.

In general, one of the main results of the present study was the decrease in the number of LIS publications distinguished during the last three years which needs more investigation to find out the reasons. While, scientific community in present age is facing a dramatically world wide increase in number of publications all over the world, decrease in number of LIS publications is to some extent unusual. In addition, while most research findings acknowledge the interdisciplinary nature of LIS, it is expected that LIS publications would be visited by a wide range of scientific fields which as a result, leads to receiving more citations in other fields by LIS publications. Hence, unusual few numbers of citations received by each paper in this field (0.27 citations per paper) should be more considered and investigated to find out the reasons.

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APPENDIX 1

61 LIS Journals Examined in the Study and their Performance in 2008

Row	Journal Title	Papers	Total Cites	Self Cites	Impact Factor	Cited Half Life	Citing Half Life
1	ANNU REV INFORM SCI	13	477	58	2.5	6.5	7.7
2	ASLIB PROC	39	196	20	0.493	6.8	7.5
3	CAN J INFORM LIB SCI	-	55	7	-	-	9.9
4	COLL RES LIBR	30	556	62	0.781	9.1	7.9
5	ECONTENT	44	58	3	0.271	-	-
6	ELECTRON LIBR	60	161	54	0.393	4.5	5.3
7	GOV INFORM Q	40	396	88	1.910	4.1	6.5
8	HEALTH INFO LIBR J	37	187	61	0.939	3.4	6.9
9	INFORM MANAGE-AMSTER	62	2919	225	2.358	6.2	9.5
10	INFORM PROCESS MANAG	112	2003	247	1.852	7.7	7.9
11	INFORM RES	89	429	104	1	4.9	8
12	INFORM SOC	26	487	23	1.042	6.3	6.2
13	INFORM SYST J	25	528	91	2.375	6	8.9
14	INFORM SYST RES	25	2778	65	2.261	9.2	8.8
15	INFORM TECHNOL LIBR	16	98	9	0.703	-	5.7
16	INT J GEOGR INF SCI	61	1724	169	1.596	8.5	8.5
17	INT J INFORM MANAGE	51	519	41	1.043	6.7	7.7
18	INTERLEND DOC SUPPLY	31	92	70	0.484	-	2.3
19	J ACAD LIBR	53	503	101	0.667	6.8	6.4
20	J AM MED INFORM ASSN	100	2574	334	3.428	5.2	5.7
21	J AM SOC INF SCI TEC	184	3967	595	1.954	7.6	7.7
22	J ASSOC INF SYST	27	335	36	1.836	4.5	9.8
23	J COMPUT-MEDIAT COMM	36	803	117	1.901	4.6	6.6
24	J DOC	43	1014	73	1.712	9.5	8.6
25	J GLOB INF MANAG	17	200	19	1.387	4.1	9.4
26	J HEALTH COMMUN	46	955	66	2.057	4.6	7.8
27	J INF SCI	54	729	115	1.648	6.9	8.2
28	J INF TECHNOL	26	838	29	1.966	6.3	8.6
29	J INFORMETR	34	89	9	2.531	-	6.2
30	J LIBR INF SCI	18	95	9	0.562	-	8
31	J MANAGE INFORM SYST	42	2527	174	2.358	8.2	8
32	J MED LIBR ASSOC	46	538	139	1.669	3.6	5.5
33	J SCHOLARLY PUBL	25	38	23	0.455	-	9.1
34	KNOWL ORGAN	15	128	50	0.429	5.7	7.5
35	LAW LIBR J	22	217	169	0.296	>10	6.9
36	LEARN PUBL	24	102	17	0.559	4.1	3.3
37	LIBR COLLECT ACQUIS	15	85	13	0.346	-	8.6
38	LIBR HI TECH	47	109	15	0.344	3.8	3.9
39	LIBR INFORM SC	5	26	1	0.091	-	9.2
40	LIBR INFORM SCI RES	30	419	61	1.226	7.5	6.5
41	LIBR J	108	365	32	0.388	4.9	0.6
42	LIBR QUART	23	287	25	0.364	>10	8.1
43	LIBR RESOUR TECH SER	23	158	48	0.698	9.5	6.4
44	LIBR TRENDS	26	386	24	0.239	6.9	>10
45	LIBRI	19	113	5	0.156	6.7	7.2
46	MIS QUART	36	5684	244	5.183	9.7	>10
47	ONLINE	33	89	-	0.352	-	-
48	ONLINE INFORM REV	50	268	61	1.103	3.4	5.3
49	PORTAL-LIBR ACAD	23	218	20	1.146	4.2	6.5
50	PROF INFORM	73	85	54	0.4	-	5.5
51	PROGRAM-ELECTRON LIB	25	193	7	0.286	>10	4.2
52	REF USER SERV Q	34	105	31	0.339	5.2	6.2
53	RES EVALUAT	26	212	52	1	5	5.8
54	RESTAURATOR	-	110	-	0.172	9.2	-
55	SCIENTIST	80	311	49	0.353	3.7	2.4
56	SCIENTOMETRICS	128	2492	623	2.328	5.6	6.9
57	SERIALS REV	19	112	13	0.383	4.8	7.3
58	SOC SCI COMPUT REV	33	360	37	0.714	5.9	6.4
59	SOC SCI INFORM	33	295	15	0.341	>10	9.1
60	TELECOMMUN POLICY	54	629	177	1.244	5.9	6.3
61	Z BIBL BIBL	23	4	-	0.019	-	6.5

APPENDIX 2

Frequency and Percentage of LIS Publications in Different Countries

Country	Freq. of Publications	% of Publications	Country	Freq. of Publications	% of Publications	Country	Freq. of Publications	% of Publications
USA	61749	61.88	Thailand	38	0.03	Yugoslavia	4	0.004
UK	3320	3.32	Portugal	37	0.037	Zambia	4	0.004
Canada	2338	2.34	Botswana	33	0.033	Indonesia	3	0.003
Germany	811	0.81	Hong Kong	32	0.032	Jamaica	3	0.003
Australia	622	0.62	Croatia	28	0.028	Nepal	3	0.003
Netherlands	519	0.52	Chile	26	0.026	Swaziland	3	0.003
China	463	0.46	Argentina	25	0.025	Zimbabwe	3	0.003
Spain	461	0.46	Egypt	24	0.024	Algeria	2	0.002
Scotland	455	0.45	Malaysia	24	0.024	Bhutan	2	0.002
France	397	0.39	Saudi Arabia	24	0.024	Fiji	2	0.002
New Zealand	376	0.37	Kuwait	21	0.021	Guatemala	2	0.002
South Africa	347	0.34	Slovakia	21	0.021	Morocco	2	0.002
Taiwan	314	0.31	UAE	15	0.015	Oman	2	0.002
South Korea	295	0.29	Ghana	14	0.014	Peru	2	0.002
Belgium	289	0.29	Iceland	14	0.014	Sierra Leone	2	0.002
Italy	273	0.27	Kenya	13	0.013	Syria	2	0.002
India	268	0.26	Pakistan	13	0.013	Vietnam	2	0.002
Singapore	263	0.264	Trinidad & Tobago	11	0.011	Albania	1	0.001
Finland	242	0.243	Bulgaria	10	0.010	Antigua & Barbuda	1	0.001
Denmark	222	0.223	Czech Republic	10	0.010	Bolivia	1	0.001
Sweden	221	0.222	Colombia	9	0.009	Brunei	1	0.001
Wales	205	0.205	Uruguay	9	0.009	Cameroon	1	0.001
Japan	202	0.202	Bangladesh	8	0.008	Costa Rica	1	0.001
Israel	161	0.161	Panama	8	0.008	Dominican Rep	1	0.001
Brazil	153	0.153	Romania	8	0.008	Honduras	1	0.001
Switzerland	147	0.147	Tanzania	8	0.008	Iraq	1	0.001
Norway	128	0.128	Cuba	7	0.007	Latvia	1	0.001
Hungary	106	0.106	Jordan	7	0.007	Macao	1	0.001
Greece	103	0.103	Luxembourg	7	0.007	Malawi	1	0.001
Ireland	93	0.093	Philippines	7	0.007	Maldives	1	0.001
Austria	91	0.091	Uganda	7	0.007	Malta	1	0.001
Turkey	79	0.079	Cyprus	6	0.006	Moldova	1	0.001
North Ireland	75	0.075	Lebanon	6	0.006	Mongolia	1	0.001
Slovenia	75	0.075	Sri Lanka	6	0.006	Mozambique	1	0.001
Russia	69	0.069	Namibia	5	0.005	New Caledonia	1	0.001
Nigeria	67	0.067	Senegal	5	0.005	Papuan Guinea	1	0.001
Lithuania	60	0.060	Estonia	4	0.004	Qatar	1	0.001
Mexico	50	0.050	Ethiopia	4	0.004	Vatican	1	0.001
Poland	43	0.043	Ukraine	4	0.004			
Iran	41	0.041	Venezuela	4	0.004			