

# RESEARCH COLLABORATION AMONG LIBRARY AND INFORMATION SCIENCE SCHOOLS IN SOUTH AFRICA (1991– 2012): AN INFORMETRICS STUDY

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## ABSTRACT

This study sought to assess the extent of research collaboration in Library and Information Science (LIS) schools in South Africa between 1991 and 2012. Informetric research techniques were used to obtain relevant data for the study. The data was extracted from two EBSCO-hosted databases, namely, Library and Information Science Source (LISS) and Library, Information Science and Technology Abstracts (LISTA). The search was limited to scholarly peer reviewed articles published between 1991 and 2012. The data was analysed using Microsoft Excel ©2010 and UCINET for Windows ©2002 software packages. The findings revealed that research collaboration in LIS schools in South Africa has increased over the past two decades and mainly occurred between colleagues from the same department and institution; there were also collaborative activities at other levels, such as inter-institutional and inter-



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country, although to a limited extent; differences were noticeable when ranking authors according to different computations of their collaborative contributions; and educator-practitioner collaboration was rare. Several conclusions and recommendations based on the findings are offered in the article.

**Keywords:** informetrics, research collaboration, Library and Information Science schools, South Africa

## 1. INTRODUCTION AND BACKGROUND TO THE STUDY

Research is one of the core activities of academic staff at South African universities, just as is the case with any similar institution of higher learning in the world. The other responsibilities of academic staff include tuition/teaching and learning, academic citizenship and community engagement. Among these activities, research and tuition carry the most weight when it comes to performance evaluation of academic personnel in South Africa. It is not surprising therefore to find that for one to be employed to teach in universities in South Africa or for purposes of promotions and tenure, one is supposed to meet certain requirements related to research. The Department of Higher Education and Training (DHET) is also subsidising research output in qualifying books, journals and proceedings. According to the document 'Policy and procedures for measurement of research output of public higher education institution' (Republic of South Africa, Ministry of Education 2003, 5), published by the Ministry of Education, all articles published in qualifying journals, books and peer refereed conference proceedings earn a subsidy, with the exception of correspondence to editors; abstracts or extended abstracts; obituaries; book reviews; news articles and advertorials. The national and even the international imperatives and requirements as well as those specified in respective universities equally affect library and information science schools.

Ocholla and Bothma (2011) and Raju (2005) define Library and Information Science (LIS) schools in the context of South Africa as schools that offer more general or theoretical education in library and information science, as well as undergraduate and postgraduate degree qualifications which take three to four years for undergraduates, and a minimum of one to three years for honours, master's and doctorate qualifications, respectively. These qualifications are accredited by and recognized by the national qualification authorities such as the South African Qualifications Authority (SAQA). The aforementioned authors note that, since their inception, LIS schools in South Africa have formed part of a Faculty of Humanities, or Social Sciences, which still tends to be the case. However, reflecting current changes, some departments or schools have moved to other faculties or schools. For example, the LIS programmes at the Durban University of Technology (DUT) are offered in

the Faculty of Accounting and Informatics under the Department of Information and Corporate Management. At the Walter Sisulu University (WSU), the LIS department falls under the School of Social Sciences and Development Studies while at the University of Pretoria (UP), LIS is located in the School of Information Technology, Faculty of Engineering, Built Environment and Information Technology.

Ocholla and Bothma (2007, 2) observe that in the past, most departments were simply called departments of Library Science/Library Studies or Librarianship. However, the majority of departments are now referred to as departments of Information Science/Studies and no longer include the word 'library' in their names. South Africa is the only country in Africa whose LIS schools have experienced a drastic reduction in their numbers during the past ten years (Ocholla and Bothma 2011, 151). The general trend signifies that LIS schools in South Africa are decreasing in number, and those remaining are merging with other disciplines. According to Ocholla and Bothma (2011, 149), the LIS sector in South Africa constituted only 12 LIS schools in 2006, down from the 18 that existed in the year 2000. In 2011, only ten schools were offering LIS-specific subjects. The remaining LIS schools, which are the focus of this study, are located at the following institutions: University of South Africa (Unisa), University of Pretoria (UP), University of KwaZulu-Natal (UKZN), University of Zululand (UZ), University of Fort Hare (UFH), University of Cape Town (UCT), University of the Western Cape (UWC), Durban University of Technology (DUT), University of Limpopo (UL) and Walter Sisulu University (WSU).

## 2. LITERATURE REVIEW: A BRIEF OVERVIEW

A substantial amount of research that has been conducted in the area of collaboration suggests that collaboration varies across institutions, fields, sectors and countries and as such, what is viewed as a collaborative activity in one department, institution or country, or even field may be viewed as a mere informal link in another (Katz and Martin 1997, 26; Subramanyam 1983). These authors, among others, have further noted that funds, the desire for intellectual interactions with other scientists, the need for a division of labour and government encouragement of international and cross-sectoral collaboration are among the factors that influence collaboration (Katz and Martin 1997, 26; Maluleka, Onyancha and Ajiferuke 2016; Sacchanand 2012). Despite research collaboration being one of the areas that has received much attention from informetrics researchers, the assessment of research collaboration in LIS, and more particularly in South Africa, and Africa in general, is rare. We have however taken note of some studies that have been conducted to investigate research collaboration in other fields and/or across several fields in Africa. For instance, Onyancha's (2009) study noted that research collaboration in Sub-Saharan Africa is increasingly being conducted internationally. The results from the study showed that

individual research has been overtaken by collaborative research and the increase in collaborative research is mainly at an international level. Jacobs (2008) also carried out a study where an analysis of publications and research collaboration of five research universities in South Africa over a nine year period between 1995 and 2003 was undertaken. The study looked at the distribution of publications by institutions, index of specialisation, collaboration and patterns of co-authorship. The results suggested that South African authors collaborated more frequently with international authors than with their compatriots; findings that were reinforced in a later study by Sooryamoorthy (2009). The study further revealed that researchers from four institutions, namely Stellenbosch University (SU); University of Cape Town (UCT); University of the Witwatersrand (WITS) and the University of KwaZulu-Natal (UKZN) collaborate more internationally than they do nationally. UP's status of collaboration was almost the same nationally and internationally. Sooryamoorthy (2009) further noted that the number of citations received by a publication varies not only according to the collaboration but also to the types of collaboration of the authors who are involved in their production. The study further suggests that collaborative research in South Africa has been growing steadily and the scientists are highly oriented to collaborative research rather than individualistic research. Results further mention that international collaboration is preferred to domestic collaboration, while publications seem to be a decisive factor in collaboration. Further, the paper also looked at the collaboration dimensions of partnering countries, sectors and disciplines and examined how collaboration can be predicted by certain publication variables. Sooryamoorthy's (2010) study examined the scenario of science and scientific collaboration in South Africa during the apartheid regime and in the post-apartheid period. The results suggest that despite conflict and boycotts from the international community, there was a steady growth in science and collaboration during the apartheid era and this growth continued into the new democratic era. The results further suggest that the country's colonial past (under the Dutch and British) benefited it because colonizers allowed an inflow of scientists and academics to their countries to support scientific activities (Sooryamoorthy 2010, 374).

In the field of LIS, most studies that have been conducted are based in countries outside Africa (e.g. Aytac and Slutsky 2014; Bhue and Bhoi 2015; Maharana and Das 2014; Sethi and Panda 2012; Sin 2011). Sin (2011) investigated the longitudinal changes in geographical patterns of authorship, collaboration types, and factors affecting the citation impact of seven top LIS journals, namely: *Annual Review of Information Science and Technology*; *Information Processing and Management*; *Journal of Documentation*; *Journal of the American Medical Informatics Association*; *Journal of the American Society for Information Science and Technology*; *MIS Quarterly*; and *Scientometrics*, between 1980 and 2008. A total of 8 140 papers were analysed and the results suggest that there is an increasing representation of authors from different nations. The results further suggest that international collaboration is

mainly influenced by the aim to increase the visibility and impact of one's research. In their study, Maharana and Das (2014) analysed the growth and development of LIS research carried out by Indian researchers based on the publications indexed in the Social Sciences Citation Index (SSCI). The researchers analysed 140 documents with an  $h$ -index of 7 and above. The  $h$ -index is an indicator that was developed by JE Hirsh in 2005 as a measure to evaluate the scientific output of a researcher, taking into consideration both the number of publications and citations. Hirsh (2005) observed that a scientist has index  $h$  if  $h$  of his/her  $N_p$  papers have at least  $h$  citations each, and the other  $(N_p - h)$  papers have fewer than  $h$  citations each). The results suggest that the annual publications of Indian researchers range from 9 to 10 papers with 0.64 degree of collaboration. The most publications were articles (125, 89.29%), and they ranged between 6 and 10 pages in length. Lotka's law of scientific productivity was used to determine authors' productivity during the period under study. Sethi and Panda (2012) conducted a study where the publication trends of scholarly journal articles in two core LIS journals (*International Information and Library Review* and *Library and Information Science Research*) indexed under ScienceDirect Database between the years 2000 and 2010 were examined. The study examined the content of the journals, including growth of the literature, authorship patterns, geographical distributions of authors, distribution of papers by journal, citation pattern, ranking pattern, length of articles, and most cited authors. Collaboration was also looked at and Lotka's law was used to identify authors' productivity. The study identified the eight most productive authors who had over 19 publications in the field. Even though the findings suggested that the authors' distributions did not follow Lotka's law, it was evident that these publications experienced rapid and exponential growth.

Other studies that have been conducted to address the issue of collaboration in the field of LIS have tended to focus more on teaching and learning as well as curriculum development than on research (e.g. Foo et al. 2006; Sacchanand 2012). Whereas Sacchanand (2012) reviewed the needs for collaboration between LIS educators and practitioners in Thailand, Foo et al. (2006) looked into initiatives that offer potential collaboration and cooperation among LIS educators, particularly in the Asia Pacific context. Some of the areas of potential collaboration that were identified in Thailand by Foo et al. (2006) include participation in workshops, symposiums and conferences; implementing a portal for education; developing a repository of learning objects and resources; assuring quality through accreditation; and promoting and sustaining research and scholarship. These activities are potential collaborative areas among educators while those reviewed by Sacchanand (2012) are largely related with collaboration between educators and practitioners. The collaboration between educators and practitioners, according to Sacchanand (2012, 6) would focus on such activities and programmes as curriculum development,

teaching and learning, information literacy instruction, professional/practical experiences training, research, management of libraries (e.g. an educator serving as a Library Board member), promoting library use, and consultancy. It is worth noting that both studies cited research as one area of collaboration among and/or between educators and practitioners.

In terms of collaboration in LIS research in South Africa or Africa, the subject domain has not been explored yet. To the best knowledge of the authors, only two studies have attempted to explore research collaboration in LIS in the region (see Maluleka et al. 2016; Ocholla 2008). Whereas Ocholla's (2008) study investigated research collaboration as part of his broad study, Maluleka et al. (2016) sought to explore the factors that influence research collaboration in LIS schools in South Africa. The findings in Ocholla's (2008, 475) study led him to conclude as follows: 'Research collaboration is weak also. There is little collaboration among LIS schools in Africa. Research collaboration between LIS schools in Africa and those outside Africa appears to be developing faster than internal (African) collaboration'.

Maluleka et al. (2016) conducted a survey to assess the factors that influence research collaboration among the teaching staff in LIS schools in Africa. The study identified both the enhancers and inhibitors of research collaboration whereby factors such as networking, sharing of resources, enhancing productivity, educating students, overcoming intellectual isolation, and accomplishments of projects in a short time as well as learning from peers were found to greatly influence research collaboration in LIS in South Africa. The inhibitors of research collaboration among the teaching staff in LIS schools in South Africa were identified as bureaucracy and red tape, lack of funding, unethical behaviour of collaborators, distance between researchers, level of education of collaborators, and inadequate competencies on the part of potential collaborators.

### 3. PURPOSE OF THE STUDY

The purpose of the study was to investigate the patterns, trends and nature of collaboration in library and information science research in South Africa between 1991 and 2012. Specifically, the study focused on:

- analysing the trend of publication of LIS research in South Africa from 1991 to 2012;
- measuring the extent of research collaboration in LIS in South Africa;
- identifying the authors with most collaborations;
- assessing the levels of collaboration among LIS scholars in South Africa.

## 4. RESEARCH METHODOLOGY

The study adopted an informetrics approach to investigate the patterns and trends of research collaboration in library and information science in South Africa. According to Bar-Ilan and Peritz (2002), informetrics is used to study quantitative aspects of information in any form and in any social group. Bibliometric/informetric studies are widely used to inform policies and decisions in political, economic, social and technological domains affecting information flow and the use pattern within, between and outside institutions and countries. Therefore the choice of this research method was founded on the basis that trends and developments in society, science and business can be traced through informetric analysis of databases (Wormell as cited by Onyancha 2007, 52). Furthermore, informetrics is 'one of the most widely used quantitative approaches when measuring research productivity and scientific impact, and its broad scope, upon comparing it with other related metric approaches' (Onyancha 2007, 25). It is, however, important to mention a few limitations to informetric data, particularly as regards the use of databases. According to Archambault and Gagne (2004, 9), the validity of informetric research evaluation through the use of databases can be affected by the following:

- limited coverage;
- exclusion of certain types of documents;
- classification of journals by discipline;
- changes in journal titles;
- names spelled the same way;
- number of authors (and distribution of work);
- excessive, selective, secondary, negative and erroneous citation, self-citation and personal strategies.

The above limitations were addressed by using multiple databases wherein the data obtained from the databases supplemented each other.

Co-authorship was used as a proxy for measuring research collaboration. Newman (2004), Osborne and Holland (2009) view co-authorship as joint or multi-authored studies. One can simply say that co-authorship happens when two or more people work together on a particular project, or when people work together and combine their contributions on a single project. Onyancha (2008) argues that co-authorship is the most commonly used informetric indicator in describing research collaboration and cooperation. Similarly, Katz and Martin (1997, 3) mention that for decades the multi-author publication, frequently referred to as a co-authored publication, has been used as a basic counting unit to measure collaborative activity. From the onset, however, it is important to note that not all collaborative efforts end up in co-authorship, nor does the writing of co-authored papers necessarily imply a

close collaboration between the authors (Luukkonen, Persson and Sirvertsen 1992). Lundberg (2006, 17) argues that in cases where university researchers collaborate with researchers from the industries, they (university researchers) might choose to publish the results of their collaborative work without mentioning the involvement of the industrial researchers. In so doing, such collaborations will not be identified by using co-authorship as a measure. Lundberg (2006, 17) also mentions that other publications may appear to be inter-institutionally co-authored while in fact no collaboration took place. According to Lundberg (2006, 17), the above could occur when a researcher has moved from a university to industry and in his/her publications lists both the prior and the current affiliation. Having said that, co-authorship has been extensively used and generally accepted as a measure of research collaboration in bibliometric/informetric studies (Onyancha 2007, 72).

In order to obtain relevant data for the study, we identified the teaching staff working in each of the ten LIS schools in South Africa using the LIS schools' websites. We then prepared and confirmed the list of names by circulating it among two heads of departments who had served as Chairs of RETIG (Research and Teaching Interest Group of the Library and Information Science Association of South Africa). We also relied on our knowledge of the composition of teaching staff in the schools. The names of the authors were then used in the search queries to extract research articles published by each author as indexed in the EBSCO-hosted databases, namely Library and Information Science Source (LISS) and Library, Information Science and Technology Abstracts (LISTA). An advanced search was conducted to retrieve scholarly and peer-reviewed articles by setting the limiters to "peer-reviewed" and "scholarly journals". The publication period was also limited to 1991 to 2012, all years inclusive. A total of 373 unique articles' were obtained from the databases and saved into the Microsoft Office Excel worksheets for analysis. The specific data obtained from the database included:

- author's name;
- title of article;
- year of publication;
- author's institutional affiliation (institution and department);
- author's country of affiliation.

The extent of collaboration among the authors was determined by computing the degree of collaboration as well as the collaboration index. The degree of collaboration (DC) as defined by Subramanyam (1983), Zafrunnisha and Pullareddy (2009) and recently by Sangam and Mogal (2013) is the ratio of the number of collaborative research papers to the total number of research papers published in a certain period of time, and can be expressed as follows:

$$DC = Nm / (Nm + Ns)$$



Where:

DC = Degree of collaboration; Nm = Number of multi-authored papers; Ns = Number of single-authored papers

The collaboration pattern was obtained by determining the average number of authors per paper, which was calculated by dividing the number of papers by the number of authors in each year period. Presented in the collaboration patterns include information on the number of authors responsible for each paper (one, two or three and above authors per paper).

In order to map collaborations within and beyond the authors' institutional and country affiliations, only multi-authored papers were analysed. The data was organised with the use of Microsoft Excel software before being exported to UCINET for Windows (Borgatti, Everett and Freeman 2002) which was used to convert a matrix of co-authors into network readable format. NetDraw visual network, which is part of the UCINET software, was then used to generate the networks in figures 2 and 3. The thicker the lines in Figure 3, the stronger the collaboration links among the affected authors.

## 5. RESULTS

Rao and Raghavan (cited by Onyancha 2007, 82), as well as Subramanyam (cited by Sangam and Mogal (2013, 633) suggest the following commonly used measures of collaboration, that is, the degree of collaboration, which is the proportion of co-authored papers in the total number of publications, and the collaborative index which is the average number of authors per paper. In tandem with the above mentioned studies by Onyancha (2007) and Sangam and Mogal (2013), the study presents under the following subheadings: growth and distribution of papers from 1991 to 2012; extent of collaboration; top collaborating authors; authors with most collaborations; levels of collaboration; and the status of collaboration between LIS researchers.

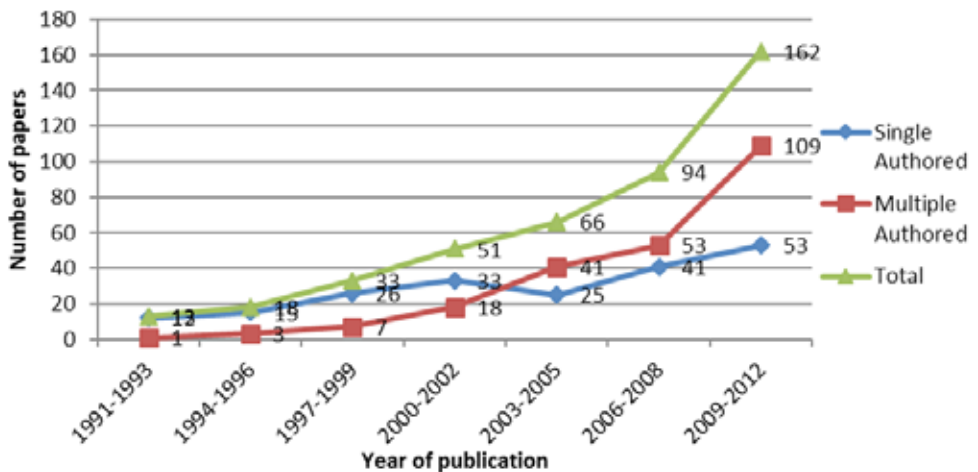
### 5.1. Growth and distribution of papers (1991–2012)

Table 1 and Figure 1 show the growth and distribution of LIS papers from 1991 to 2012. It is important to note that the authors' affiliation at this time was not considered and all articles published by the current LIS teaching staff during the specified time period, regardless of where they previously worked, formed part of the population. Between 1991 and 1993, there were 12 single-authored articles and only one multi-authored paper, thereby resulting in a total of 13 in the period.

**Table 1:** Growth and distribution of papers (1991–2012)

Year of publication	Single-authored		Multi-authored		Total
	No. of papers	% growth	No. of papers	% growth	
1991–1993	12		1		13
1994–1996	15	25.0	3	200.0	18
1997–1999	26	73.3	7	133.3	33
2000–2002	33	26.9	18	157.1	51
2003–2005	25	-24.2	41	127.8	66
2006–2008	41	64.0	53	29.3	94
2009–2012	53	29.3	109	105.7	162
Grand total	205		232		437

The number of papers increased between 1994 and 1996, when 15 single-authored and three multi-authored articles were registered as compared to the period 1991–1993 where 12 single-authored papers and one multi-authored paper were registered. This trend continued with the exception of the period between 2003 and 2005, when the number of papers decreased to 25 from the previous period’s 33. The number of single-authored papers has continued to increase, as has that of the multi-authored papers. However, it is worth noting that the multi-authored papers increased at a higher rate or ratio than the single-authored papers, with the exception of the period between 2006 and 2008.



**Figure 1:** Trend of single-authored and multi-authored papers (1991–2012)

## 5.2. Extent of collaboration

As mentioned in the methodology, the extent of collaboration was determined by computing the degree of collaboration (DC) as well as the collaboration index (CI). The results are presented in tables 2 to 4 and discussed in section 5.2.1 and 5.2.2.

### 5.2.1. The degree of collaboration

Table 2 compares the degree of collaboration in LIS research in block periods of three years. Between 1991 and 1993, 92.3 per cent of the articles were written by individual authors while 7.69 per cent were multi-authored and the degree of collaboration stood at 0.08. There was a continuous improvement on the DC as reflected in the table, which shows an improvement from 0.17 in 1994–1996 to 0.67 in 2009–2012.

**Table 2:** Degree of collaboration

Years	No. of papers	Type of authorship				Degree of collaboration
		S	%	M	%	
1991–1993	13	12	92.31	1	7.69	0.08
1994–1996	18	15	83.33	3	16.67	0.17
1997–1999	33	26	78.79	7	21.21	0.21
2000–2002	51	33	64.71	18	35.29	0.35
2003–2005	66	25	37.88	41	62.12	0.62
2006–2008	94	41	43.62	53	56.38	0.56
2009–2012	162	53	32.72	109	67.28	0.67

(Key: S = Single-authored papers; M = Multi-authored papers)

### 5.2.2. Collaboration patterns (1991–2012)

Table 3 shows the collaboration patterns for the period under investigation (from 1991 to 2012). The table reveals that the average number of authors per paper was as follows: 1991–1993 (1.07); 1994–1994 (1.5); 1997–1999 (1.24); 2000–2002 (1.41); 2003–2005 (1.83); 2006–2008 (1.72); and 2009–2012 (2.01). The average number of authors per year has continued to grow over time, a situation that may imply a shift from single-authored papers to multi-authored papers. It was, however, noted that while multi-authored papers have continued to increase, single-authored papers comprise a relatively large portion of the total publications output in LIS research in the country. Of the multi-authored papers, two-author papers formed the majority throughout the study period.

**Table 3:** Collaboration patterns and distribution of papers by number of authors (1991–2012)

Year of publication	Total number of papers	Number of authors	One-author papers	Two-author papers	Three-and above author papers	Average number of authors per paper
1991–1993	13	14	12	1	0	1.08
1994–1996	18	27	15	1	2	1.50
1997–1999	33	41	26	6	1	1.24
2000–2002	51	72	33	16	2	1.41
2003–2005	66	121	25	34	7	1.83
2006–2008	94	162	41	38	15	1.72
2009–2012	162	325	53	77	32	2.01

### 5.3. Collaborating authors according to degree of collaboration (DC)

Table 4 shows collaborating authors according to their degree of collaboration with the Collaboration Index also highlighted. This was done by ranking all authors who had five publications and more. It is important to note that the majority of authors with fewer than five articles had a very high degree of collaboration because most of them had only one or two co-authored publications. From Table 4, it is evident that the researchers who ranked high had a degree of collaboration above 0.6 while the ones at the bottom stood below 0.4.

Table 4 reveals that there were two authors who recorded a ‘perfect’ degree of collaboration, meaning that their number of multi-authored papers equalled the number of papers they authored singly, namely: Nassimbeni and Ngoepe. Other authors who exhibited a high level of collaboration included: Bothma (DC = 0.95), Hoskins (DC = 0.89), Penzhorn (DC = 0.85), Le Roux (DC = 0.8), Leach (DC = 0.71), and Ocholla (DC = 0.71). A number of these authors had largely co-authored with either their students or junior colleagues within the LIS schools in which they worked. Some of the academics who recorded a higher DC and CI authored most of their papers under the tutelage of senior colleagues, some of whom were the former’s supervisors. For instance, Ngoepe’s papers were largely co-authored with Van der Walt, who supervised his master’s studies, while Onyancha was a doctoral student under the supervision of Ocholla. This pattern of publication is reflected in Figure 3.

**Table 4:** Collaborating authors according to the degree of collaboration

Author	Total number of articles	Single-authored	Multi-authored	DC
Nassimbeni, M. C.	7	0	7	1
Ngoepe, M.	6	0	6	1
Bothma, T. J. D.	21	1	20	0.95
Hoskins, R.	19	2	17	0.89
Penzhorn, C.	7	1	6	0.86
Le Roux, C. J. B.	5	1	4	0.80
Leach, A.	14	4	10	0.71
Ocholla, D. N.	72	21	51	0.71
Mostert, B.	19	6	13	0.68
Jacobs, D.	9	3	6	0.67
Onyancha, O. B.	38	13	25	0.66
Stilwell, C.	44	16	28	0.64
De Jager, K.	21	10	11	0.52
Du Preez, M.	6	3	3	0.50
*Mutula, S.	53	26	27	0.51
Fourie, I.	45	26	19	0.42
Van der Walt, T. B.	12	7	5	0.42
Dube, L.	6	4	2	0.33
Ondari-Okemwa, E.	10	7	3	0.30
Dick, A. L.	37	28	9	0.24
Bell, F.	6	5	1	0.17
Hart, G.	9	8	1	0.11

\* Mutula published most of his works while affiliated to the University of Botswana.

#### 5.4. Authors with most collaborations

Table 5 shows the list of top LIS authors according to the number of times they collaborated in the data set. A normal count was done to determine how many times each author appeared in all co-authored articles. The top ten collaborators were Ocholla with a total of 51 co-authored papers followed by Stilwell (28), Mutula

(27), Onyancha (25), Bothma (20), Fourie (19), Hoskins (17), De Jager (11), Leach (10), Dick (9) and Nassimbeni (7) co-authored publications, thereby rounding off the top ten authors.

## 5.5. Levels of collaboration

This section discusses collaboration among LIS researchers at different levels by examining how LIS researchers collaborate with other researchers: (a) in the same department/same university; (b) with other LIS schools in South Africa; (c) with non-LIS schools in South Africa; (d) with LIS schools outside South Africa; and (e) with non-LIS schools outside South Africa (see Figure 2).

### 5.5.1. Collaboration at departmental/university level

An examination of Figure 2 reveals that the majority of researchers collaborate with their colleagues from the same department or even the same university. Almost everyone had previously engaged with someone from the same institution in the conduct of research. Researchers such as D. N. Ocholla (20), Bothma (19), Hoskins (15), Fourie (15), Stilwell (14), De Jager (11), Dick (10) and Mostert (10) appear to be at the forefront of conducting research at this level.

**Table 5:** Authors with most collaborations

	Researcher's name	NC		Researcher's name	NC
1	Ocholla, D. N.	51	21	Knoetze, J. J.	3
2	Stilwell, C.	28	22	Ndwandwe, S.	3
3	*Mutula, S.	27	23	Tinashe, M.	3
4	Onyancha, O. B.	25	24	Dube, L.	2
5	Bothma, T. J. D.	20	25	Fredericks, G. H.	2
6	Fourie, I.	18	26	Maluleka, J. R.	2
7	Hoskins, R.	17	27	Mnkeni-Saurombe, N.	2
8	De Jager, K.	11	28	Nsibirwa, Z.	2
9	Leach, A.	10	29	Shongwe, M.	2
10	Dick, A. L.	7	30	Bell, F.	1
11	Nassimbeni, M. C.	7	31	Evans, N.	1
12	Jacobs, D.	6	32	Holmner, M.	1
13	Ngoepe, M.	6	33	Khomo, M.	1
14	Penzhorn, C.	6	34	Mokwatlo, K.	1

	Researcher's name	NC		Researcher's name	NC
15	Van der Walt, T. B.	5	35	Mrs L Ball	1
16	Le Roux, C. J. B.	4	36	Nkomo, N.	1
17	Ondari-Okemwa, E.	4	37	Oyieke-Ingutia, L.	1
18	Wessels, N.	4	38	Reddy, R.	1
19	Du Preez, M.	3	39	Schutte, M.	1
20	Jiyane, G. V.	3	40	Sewdass, N.	1

*NC = Number of co-authored papers*

### 5.5.2. Collaboration at national level (with other LIS schools in South Africa)

Figure 2 further shows the number of researchers engaging in collaborative research with fellow researchers from other institutions within the borders of South Africa. Again at this level there are researchers like Ocholla (28), Bothma (19), and Onyancha (19) and a few others who are working collaboratively beyond their institutions but within South Africa. It is however important to note that fewer researchers are engaged in collaborative activities at the national level when compared to collaboration at institutional level.

### 5.5.3. Collaboration with non-LIS researchers in South Africa

This type of collaboration was assessed by examining the partnerships that occurred between LIS researchers and authors from industry or other departments that are not involved in the teaching of LIS subjects in the country. Only a handful of our current LIS researchers under study engaged with people outside the LIS sector. Figure 2 shows that Stilwell (7) had the most number of collaborations with non-LIS researchers, while Hoskins, Hart and Dlamini each collaborated once mainly because they participated in the same project that involved more than fifteen institutions both locally and internationally.

### 5.5.4. Collaboration with LIS schools outside South Africa

This is the level of collaboration at which partnerships occurred between researchers in South Africa and their international counterparts. This type of collaboration is sometimes known as international collaboration. Figure 2 again shows that there is not much going on at this level. It is however important to note that besides the aforementioned project that involved a number of institutions, there are researchers such as Ocholla (3); Jacobs (2) and Mostert who are engaging at this level. It is also worth mentioning that the other thing that may affect the results of collaboration at

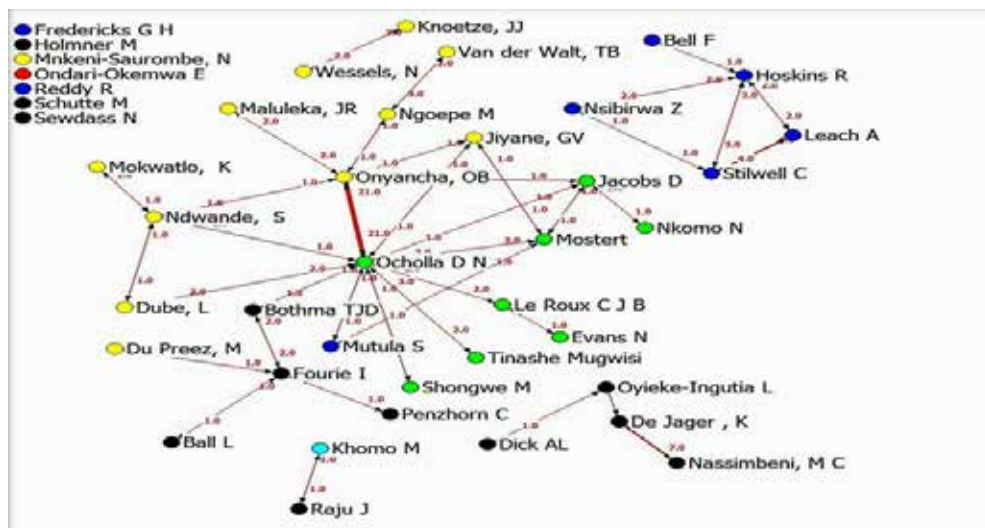




countries were Mary Henton (Congo Initiative), Henk van Dam (Royal Tropical Institute), and Helen Boelens (ENSIL Foundation).

### 5.6. Mapping collaborations among LIS researchers in South Africa

Figure 3 maps research collaboration among and between individual authors in LIS schools in South Africa. At the top left corner are researchers who had no collaborative links with fellow researchers attached to LIS schools in South Africa between 1991 and 2012. The thick lines or links between the nodes show the strength in collaboration between the researchers. Ocholla and Onyancha (21) had the most number of co-authored papers followed by De Jager and Nassimbeni (7) while Stilwell and Leach also showed strong collaboration links. Ocholla had collaborated with the most number of researchers (i.e. 11) followed by Onyancha (5) and Fourie (4), Hoskins (4) and Jacobs (4). A number of researchers had one, two or even three collaborative works, largely within their respective institutions.



**Figure 3:** A social network map of collaborating LIS researchers in South Africa

## 6. DISCUSSIONS AND CONCLUSIONS

The results of the study indicate that collaboration in LIS research in South Africa has steadily increased between 2003 and 2012 as opposed to the period between 1991 and 2002 when the majority of the papers were singly authored. The pattern of multi authorships that were witnessed between 2003 and 2012 was in line with

what other scholars (e.g. Katz and Martin 1997; Kim 2006; Kostoff 2001; Onyancha 2007; Sooryamoorthy 2009) have noted in other fields of research and/or study, i.e. research collaboration is increasingly becoming common among researchers. The current study has revealed that the number of multi-authored papers more than doubled that of single-authored papers between 2009 and 2012. The degree of collaboration was 0.08 between 1991 and 1996, but it improved significantly over the years and by the end of 2002, it stood at 0.35. The trend continued and by the end of 2012, the degree of collaboration was 0.67. Overall, the degree of collaboration in LIS articles between 1991 and 2012 was recorded to be 0.53 and it may continue to increase in the future. We envisage continued collaboration, especially between junior academics and their senior colleagues, as the number of junior academics in LIS schools in South Africa continues to increase as a result of the government's directive to universities to increase PhD holders in the country. We have also noted an emphasis on multi-disciplinary and interdisciplinary research at institutions of higher learning in South Africa.

The growth of collaborative research among LIS researchers in South Africa was further confirmed through the Collaboration Index. From just under an average of 1.5 authors per paper between the years 1991 and 2002, the value increased to above 1.8 in 2003 and by the end of 2012 it was standing at 2.0. Whereas the average number of authors per paper remained below two for the better part of the period under investigation, it nevertheless hit the perfect co-authorship value of two authors per paper in 2009–2012. The 2009–2012 period yielded a total of 109 multi-authored papers, accounting for 67.3 per cent of all papers published in that period. The growth of collaborative activities among LIS scholars can be attributed to several reasons, among them being the mentorship programmes that have been initiated in various universities in the country. For example, it is now mandatory at Unisa for senior researchers (both in age and experience) to mentor a junior protégé in matters of teaching and learning as well as research (Maluleka et al. 2016; Ngoepe and Jiyane 2015). Often, the relationship results in co-publication of articles in journals. Maluleka et al. (2016, 345) observe the following: 'In some universities such as Unisa, huge funds have been invested into the development of young researchers through initiatives such as the mentorship programmes.' In some instances, the junior colleagues are students in LIS at master's or doctoral levels of study, under the supervision of senior researchers in the same institution or another institution in the country (see Maluleka et al. 2016).

In the assessment of the LIS researchers who produced the most number of collaborations, it was noted that senior researchers were actively involved in research collaboration with fellow colleagues and more particularly with junior researchers. Whether this type of relationship is 'forced' or voluntary could not be determined from the bibliometric data. However, it has been observed in a survey that was conducted by Maluleka et al. (2016) that senior researchers are willing

to collaborate with junior researchers as long as certain barriers of collaboration are removed. Maluleka et al. (2016) have outlined a number of reasons to explain why senior researchers may not collaborate with junior researchers (mentees). Senior researchers were reported to have argued that they are willing to 'share their knowledge and skills [with mentees] but if the partner is not willing to learn then it defeats the whole purpose'. Maluleka et al.'s (2016) study further revealed that other factors that may hinder senior researchers from collaborating with junior researchers (and other mentees such as students) include the mentees' laziness, lack of competencies, poor work ethic, and not following instructions. Regardless of the aforementioned obstacles to effective collaboration, it was gratifying to note that there is an increase of research collaboration between senior LIS researchers and their junior counterparts. This should be encouraged in order to maximise the benefits of collaboration as outlined by Katz and Martin (1997).

It was interesting to observe that the ranking of LIS researchers according to the number of co-authored papers, on the one hand, and the degree of collaboration, on the other hand, did not yield similar patterns. When ranking scholars according to the degree of collaboration, Nassimbeni, Ngoepe and Bothma are ranked at the top while, when assessing scholars with the most number of co-authored papers, Ocholla, Stillwell and Mutula are ranked highest. It follows therefore that ranking researchers by simply counting the number of co-authored papers may yield biased results which may favour the most senior researchers who published more articles or who have been conducting research for longer, and most often in collaboration with their students. It would therefore be advisable to rank the most collaborating authors by examining the degree of collaboration to reduce biases.

With regard to the level of collaboration, the study found that collaboration in LIS schools in South Africa mainly occurred among colleagues working in the same department. There were, however, strong collaboration links between some researchers from different LIS schools within South Africa. The strongest collaboration link observed was between Ocholla (UNIZULU) and Onyancha (Unisa). Stilwell and Leach (UKZN) recorded a number of co-authored publications between them, and there also strong ties between De Jager and Nassimbeni (UCT). We noted also that there was a project that involved 15 institutions (including institutions outside South Africa), government department and the professional association, which brought a large number of the library schools together. However, schools like DUT, UL and WSU did not have any collaborative work recorded with other schools. It is important to state that the links witnessed were mostly informal between individual colleagues from these schools. There was no evidence of any formal collaboration link between the schools, where, for example, curriculums, students or maybe joint collaborative projects were undertaken and shared. A survey conducted by Maluleka et al. (2016) to investigate the factors that influence research collaboration also found strong collaboration links among the abovementioned schools. The study reported that 80

per cent of the respondents agreed that they were collaborating with their fellow researchers with only less than 20 per cent not engaging in collaboration at this level. The current study further revealed that collaboration between LIS researchers and practitioners is rare or minimal. This is a real concern because such partnerships may benefit the profession by bringing practical experiences into the formal offerings/qualifications and also by enhancing research that is relevant to society and the industry. It is highly recommended that collaborative research involving researchers in LIS schools and the practitioners (e.g. librarians, archivists and record managers, to name just a few) is encouraged. One way of bringing practitioners and educators together through research is by enlisting practitioners as post-graduate students under the supervision of the LIS educators. In this way, we might witness the emergence of research collaboration between practitioners and LIS educators. As Foo et al. (2006, 4) argue,

rigorous research and scholarship must continue to prevail among educators and researchers in order to make LIS course offerings and education more up-to-date, relevant and challenging for students, in contributing towards knowledge and sharing findings that can have impact globally.

As a result, the authors advise that there is a need to foster and nurture the creation of a network of LIS educators and professionals to foster collaboration and cooperation.

As was the case with LIS schools-industry collaboration, research collaboration between researchers in LIS schools in South Africa and their counterparts as well as non-LIS researchers in foreign countries was rare or minimal. The low level of involvement with international research has also been reported by Maluleka et al. (2016), who noted that over 70 per cent of respondents indicated that they rarely collaborated with international researchers and only 16 per cent of the respondents confirmed collaboration at this level. Some scholars have explained this pattern by attributing it to South Africa's long ban from participating in global events during the apartheid regime, which came to an end in 1994. The creation of collaboration networks beyond South Africa was therefore hampered up until that time, but even after 1994, not much has changed. Onyancha (2011, 110), in his study of research collaborations between South Africa and other countries between 1986 and 2005, noted an exponential growth in the number of co-authored papers and predicted that the pattern would 'persist now that South African scholars are increasingly becoming visible, both continentally and internationally'. It is, therefore, strange to note that international collaboration among South Africa's LIS researchers has not taken off as expected. We believe that it is likely that some researchers might have collaborated and published with international researchers without this being revealed because their collaborating partners might have been research fellows in the former's institutions. It has been argued that visiting researchers (including post-doctoral research fellows) and students are likely to improve South Africa's

international collaboration index (Onyancha 2011). Upon examination of the co-authored papers and more particularly the researchers from other countries that South African LIS researchers mostly collaborated with, the study found that there are strong collaboration links between South Africa and Tanzania as well as South Africa and Botswana. South African researchers also collaborated with researchers from other parts of the world, such as Denmark, Uganda, Kenya, Netherlands, Nigeria, the United States, Canada and Portugal. The majority of these collaborative efforts took the form of educator-mentee (where the mentee is a student) relationships.

Recommendations for further research are made in respect of the following:

- an investigation into research collaboration in all African LIS schools;
- a study on the influence of specific models of research collaboration on research output in LIS in South Africa, in particular, and Africa in general.

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