THE LIGHT : Journal of Librarianship and Information Science
Vol. 2 No. 1, Juni 2022: 1-10
E-ISSN : 2809-8773

Identifying and Mapping Study of the Information Professional in Library with Scientometric Analysis

Kamaludin[1*]; Abdurrakhman Prasetyadi[2]
[1]Directorate of Repository, Multimedia, and Scientific Publishing-National Research and Innovation Agency
[2]Research Center for Data and Information Science-National Research and Innovation Agency

[1]Email: kamaludin1961@gmail.com

ABSTRACT
The development of information in the digital era forces librarians to change their roles to become information professionals who have modern skills to face challenges in the digital environment. This study aimed to determine the extent of the studies conducted on information professionals in libraries and to find out the themes and terms that were often used, the trend of topics each year, and the social networks of the authors. The method used was Scientometric analysis using a single search in the Lens.org database. Articles were searched using the terms "information professional" AND "library" in the title. The data obtained were 1523 publications from 1950 to 2020. The results of this study showed that in 2011 and 2014 the largest number of publications were 76 and 84 articles, respectively. In addition, the average growth rate related to publications among information professionals was quite high at 29% during the analyzed period. The study themes were divided into 4 major theme groups and the basic theme was the most frequently used. Then the term that most often appears was "information" with 1110 repetitions. There were also technical terms such as digital, application, and internet which indicate that the study of information professionals had adapted to systems in the digital era. Following the trend of topics in the third quarter (2013-2020), it showed more about the LIS and skills.

ABSTRAK
Perkembangan informasi di era digital memaksa pustakawan mengubah perannya menjadi profesional informasi yang memiliki keterampilan modern untuk menghadapi tantangan di lingkungan digital. Penelitian ini bertujuan untuk mengetahui sejauh mana studi yang dilakukan terhadap profesional informasi di perpustakaan dan untuk mengetahui tema dan istilah yang sering digunakan, tren topik setiap tahun, dan jejaring sosial penulis. Metode yang digunakan adalah analisis *Scientometric* dengan menggunakan single search pada database Lens.org. Artikel dicari menggunakan istilah *"information professional" AND "library"* dalam judul. Data yang diperoleh sebanyak 1523 publikasi dari tahun 1950 hingga 2020. Hasil penelitian ini menunjukkan bahwa pada tahun 2011 dan 2014 jumlah publikasi terbesar berturut-turut adalah 76 dan 84 artikel. Selain itu, tingkat pertumbuhan rata-rata terkait publikasi dikalangan profesional informasi cukup tinggi yaitu 29% selama periode yang dianalisis. Tema penelitian dibagi menjadi 4 kelompok tema besar dan tema dasar adalah yang paling sering digunakan. Kemudian istilah yang paling sering muncul adalah *"information"* dengan 1110 pengulangan. Ada juga istilah-istilah teknis seperti digital, aplikasi, dan internet yang menunjukkan bahwa kajian para profesional informasi telah beradaptasi dengan sistem di era digital. Mengikuti tren topik pada kuartal ketiga (2013-2020), lebih banyak menampilkan LIS dan keterampilan.

Keywords: Information professional; Library; Scientometrics; Librarian role; Digital.

1. INTRODUCTION
Currently, libraries are shifting their role from traditional information resource custodians to digital information resource providers. Widespread use of computers, increasing dependence on computer networks, the rapid growth of the Internet, and the explosion in the quality and quantity of information are forcing libraries to adopt new ways and methods for storing, retrieving and disseminating information. (Quadri, 2012). Libraries and information science are currently navigating through protracted change driven by rapid technological innovation (Sridevi, 2014) (Singh & Vorbach, 2017). When viewed from these changes, libraries need professionals that can manage the information life cycle process and ensure that the needs of the organization are served.

Information professionals are considered relevant to the current state of library development. Many people are taking an interest in this new field and sometimes they are more skilled because of the knowledge of the technology they are using. In a global context, information professionals will be needed to help an increasingly open economy(Garcia Marco & Agustin Lacruz, 2000). Although the information profession is largely driven by technology, educational programs in library/information science are more reactive, even though they should be proactive in introducing technology-driven changes and innovations (Lunin, 1988). Information professionals must know and manage information sources (Khan & Ali, 2016).

The complexity of the information age requires continued education and training of technology-based information professionals (Lunin, 1988). Information professionals must have skills in programming and software development to avoid too much dependence on the Information Technology Department which often has other priorities. Communication, critical thinking, information literacy, and teamwork are common skills required by information professionals in a digital library environment (Chikonzo et al., 2014). Information professionals must be skilled at networking among themselves and using information and shared expertise to solve problems. Like any other group of workers, information professionals are acutely aware that change, to varying degrees, is an inevitable part of the environment. Some of the roles of traditional libraries as information professionals are declining, due to advances in technology, core skills in organization and knowledge retrieval, as well as in analysis and engagement of user needs, this poses a great challenge and potential for adapting to technology (Maclean, 2006).

Another big challenge is the amount of information overload. Every day we hear more information than we can absorb. But even this is not a new phenomenon. What is new is the degree and type. And several solutions such as data visualization, data analysis, and technology-based data mining. Just as mechanical machines enabled the industrial revolution and expanded human physical strength, computers have forced the information revolution and will expand the power of our minds. So, information professionals need to have the skills to address this information overload for the next generation. Other challenges, such as higher information literacy and user expectations have been oriented to information technology. Information professionals need to rethink service provision to accommodate rapidly changing user profiles (Carroll, 2012).

From the description above, this research aims to: 1) determine the extent of professional studies of information in libraries; and 2) find out the most common themes and terms, research topic trends, and collaborative networks from the study of information professionals in libraries.

2. LITERATURE REVIEW

The definition given to an information professional in the survey is a practitioner who works in a library or learning resource environment (Turner, 2005). Information professionals come from different backgrounds and use a variety of labels to describe themselves (Lunin, 1988). In contrast to the traditional librarian's role as organizers, managers, and disseminators of information (Burns, 2016). Information professionals manage the information lifecycle processes and ensure that the organization's needs are served. In addition, information professionals with higher computing skills tend to use their electronic information resources (Quadri, 2012).

Information professionals and librarians can play an important role when managing knowledge, to achieve this they need to be equipped with certain additional skills, making the role of information professionals fraught with challenges (Tripathy et al., 2007). As the digital age grows, librarians and information professionals must work in partnership with the administration to focus on information development (Brochu & Burns, 2019).

The literature also indicates that future information professionals will need more training in soft skills to successfully lead and manage information organizations (Singh & Vorbach, 2017). Several studies have addressed the need for information professionals to possess interpersonal communication skills, in addition to professional skills for effective teamwork and collaboration. Much has been written about what constitutes the overall competencies required of modern information professionals working in libraries and information organizations (Ahmad et al., 2016). Information professionals can use their collaboration and research skills for online model development using key resource materials in their library collections to develop a variety of teaching and learning experiences (Burns, 2016).

Information professionals now have a better starting point to initiate gradual changes to promote reproducible research (Antognoli et al., 2020). Librarians as information professionals can make significant changes in increasing access to books, and all other forms of information (Phinney & Paterson, 2017). Technological innovation, societal expectations for experiential information services, and the growth of online programming have significantly impacted the role of information professionals regardless of the type of information organization they work for(Singh & Vorbach, 2017).

3. METHOD

This research was conducted in February 2022 and uses a database, namely Lens. This portal was chosen because it is open access and has a wide coverage of published articles such as scientific works, patents, and profiles. This study uses a descriptive as well as quantitative approach to identify the characteristics of the development of the information professional field in libraries as well as to highlight potential trends for future studies.

This research has scientometric characteristics based on scientific articles indexed in Lens. The scientometric technique is a method that refers to the visualization or mapping of knowledge domains (Pollack & Adler, 2015). The scientometric research aims to analyze the intellectual landscape of the knowledge domain and understand the questions researchers are trying to answer, as well as the methods they have developed to achieve their research goals (Paul, 2001).

Based on the methodological procedures used, this study carried out four steps which are illustrated in Figure 1.

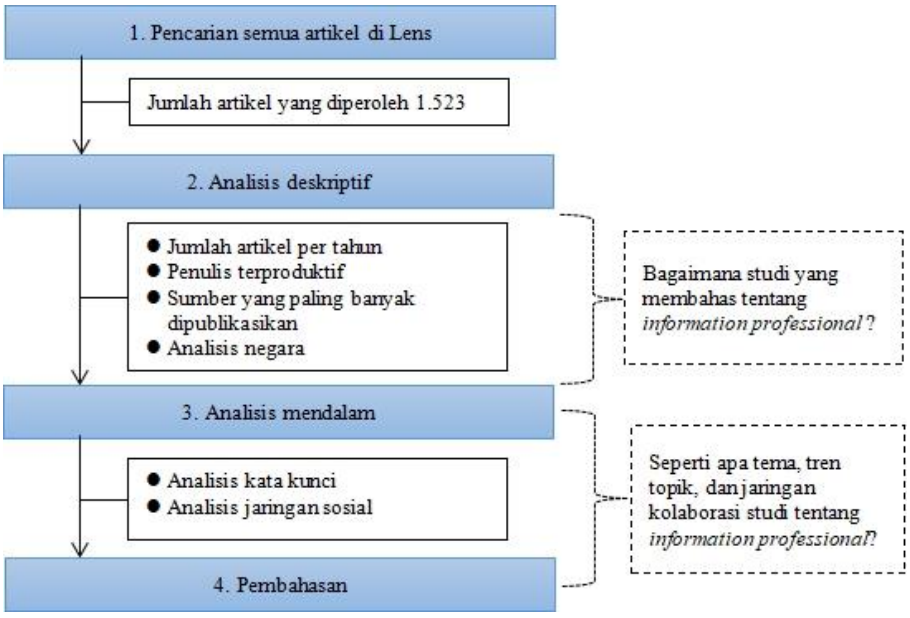

Figure 1. Research flowchart
Source: modification (Gandia et al., 2017)

Figure 1 describes the steps taken, the first step is that the article is searched in the Lens database in one search, the time range is not specified, and uses the Boolean operator "AND". The use of "AND" is intended so that the documents found contain a combination of terms including "information professional" and "library". Articles were searched using the title of the following terms: (professional information) AND title: library. This search returned 1523 results, starting in 1950 and ending in 2021.

The second step, descriptive analysis is carried out as follows: 1) the number of articles per year based on the type of document; 2) the most prolific writers; 3) most published sources; 4) analysis of the country.

In the third step, this study conducted an in-depth analysis in Bibliometrix (Aria & Cuccurullo, 2017) of 1,523 articles as follows: 1) analysis of the most frequently occurring keywords; 2) trending topics; and 3) social network analysis.

The fourth step, this research conducts interpretation and discussion of the results in the second and third steps, to identify the main research trends and gaps in the field of information professional study.

4. RESULTS AND DISCUSSION

4.1 Results

The distribution of 1,523 published articles on the subject of information professionals began in 1950 with the work of Watts. Then the uninterrupted evolution of professional information publications started from 1982, and from there, continued to show an exponential curve. The years 2011 and 2014 recorded the largest number of publications at 76 and 84 articles, respectively.

Figure 2 also shows the publication trend line for the information professional field of study, which from 1950 to 1992, the number of publications followed the trend line with a slight up and down (except for 1985 and 1992 which showed a larger decline). However, from 1993, the number of publications exceeded the trend line, indicating the exponential growth of this field in recent years. Compared to Bornmann's average growth rate of about 8–9% per year (Bornmann & Mutz, 2015), the average growth rate of publication-related growth in information professionals is 29% over the analyzed period. The highest average publication growth occurred in 2007 at 15.33% from the previous year.

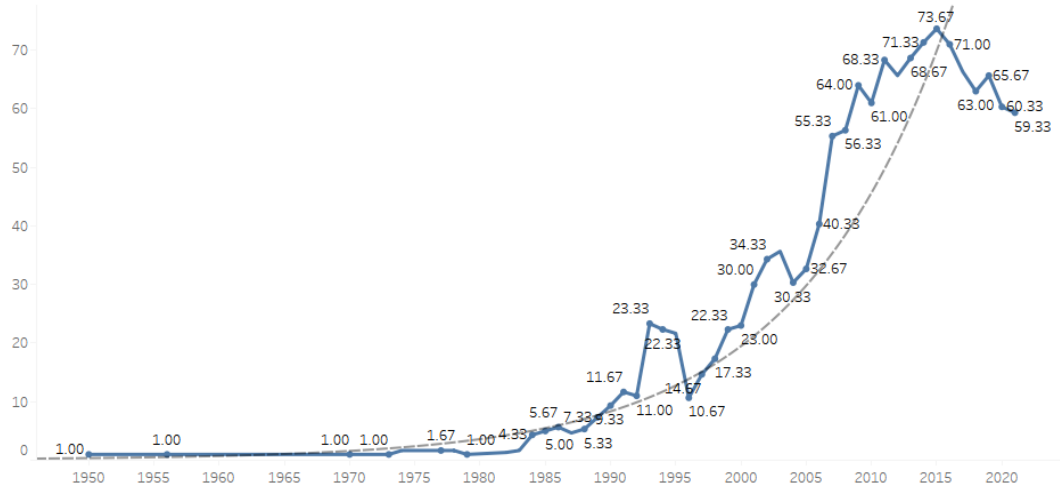

Figure 2. Number of articles per year

Source: (Lens, 2022)

Based on the results of a search on Lens, this study looked at 1000 authors who contributed to 1,523 articles. The top five most prolific authors by the number of publications include Graham Walton (39), Ann Ritchie (26), Clare Walker (22), Paul Genoni (19), and Blanche Woolls (14). Meanwhile, the writer with the highest average number of citations is Anna Kaushik with 13.33 times, followed by Helen Partridge with 12.42 times.

Table 1 shows the results of calculating Lotka's law in Bibliometrix. The results show that the productivity level of writers in the field of information professionals is not following Lotka's law because the number of author contributions in one article is above 60%. This illustrates that the productivity of writers in this field is still quite low because it is dominated by writers who only publish one article (85%). In Lotka's law, it is also stated that the contribution of the author of 2 articles should be a quarter of the author of one article, but the results here differ only by one-eighth of the number of authors of one article.

Table 1. Productivity of authors according to Lotka's law

Written Documents	N from Authors	Proportion of Authors
1	962	0.851
2	118	0.104
3	29	0.026
4	7	0.006
5	5	0.004
6	5	0.004
8	2	0.002
9	1	0.001
10	2	0.002

Source: (Lens, 2022)

Table 2 shows the top 20 most published sources such as Continuing Professional Education and IFLA (42) followed by Managing the Electronic Library (35). Meanwhile, the most cited sources are Library Management (229) and Library Review (164). Library and information-themed sources dominate all of the top 20 publications in this field. In total this study looked at 295 sources, only 0.19% of the articles were analyzed.

Table 2. Top 20 most published sources

Judul Sumber	Jumlah
Continuing Professional Education and IFLA	42
Managing the Electronic Library	35
The Australian Library Journal	29
Continuing Professional Development - Preparing for New Roles in Libraries: A Voyage of Discovery	26
Continuing Professional Development: Pathways to Leadership in the Library and Information World	21
Continuing Professional Education For the Information Society	21
Library Management	19
Library Philosophy and Practice	18
Library Review	18
New Library World	13
IFLA publications	12

Title Source	Quantity
Journal of Education for Library and Information Science	12
Journal of Librarianship and Information Science	12
Advances in Library and Information Science	11
College & Research Libraries	11
International Information & Library Review	11
Delivering Lifelong Continuing Professional Education Across Space and Time	10
SRELS Journal of Information Management	10
Journal of the Medical Library Association: JMLA	9
Libri	9

Source: (Lens, 2022)

Figure 3 shows that the United States is at the top of the top 20 countries based on the number of red-cited (32.41%) and blue-cited (29.18%). However, when viewed from the comparison of the number of institutions with the number of citations, Canada has the highest average number of citations, the 7 institutions each having an average citation of 27%. Compared to the United States which is only 6.23% and the UK 13.68% per institution.

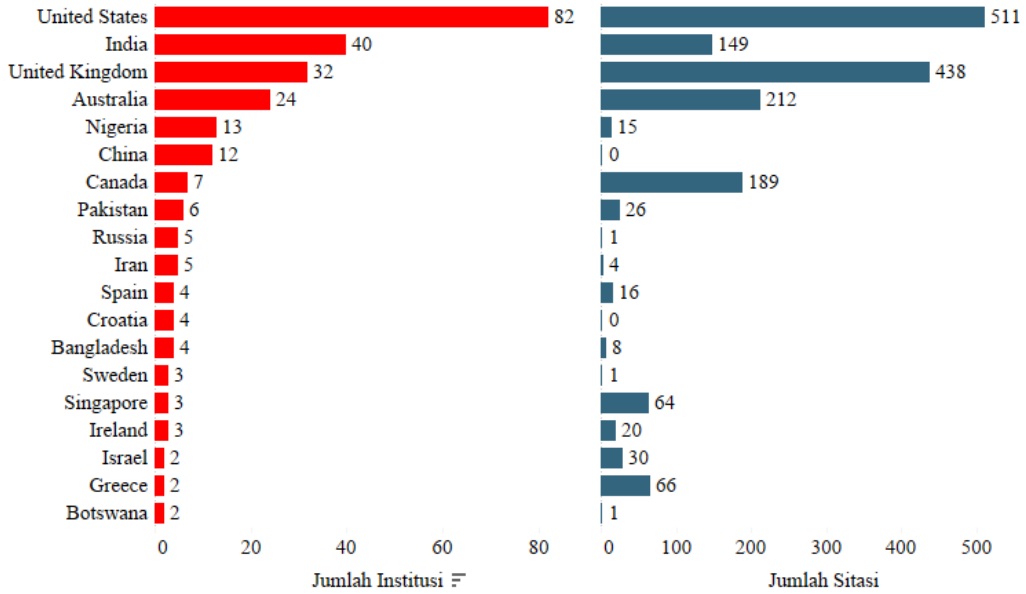

Figure 3. Top 20 countries based on number of institutions and citations
Source: (Lens, 2022)

4.2 Discussion

The thematic map for the study of information professionals in the library is divided into four major themes, namely Basic themes, Motor themes, Niche themes, and Emerging or declining themes. Basic themes are the themes that appear most often in document titles, where there is a cluster of “information” including information, library, and professionals themes. Then the second cluster "professional" includes the theme of education and development which is still in the Basic themes. The themes that appear the least are Niche themes or special themes where there are clusters of "series" themes including series and public themes.

The thematic map also shows that the study of information professionals is dominated by the theme of “education” which appears 53 times. However, what is interesting about the niche theme or specifically, the theme about health or medical appears 28 and 10 times, respectively. This

indicates that the study themes taken are quite diverse, not only libraries in higher education institutions but also in the field/health institutions. In addition, themes related to digital systems also emerged, including technology (47 times), digital (33 times), internet (28 times), electronics (18 times), and applications (5 times). As stated by Shah (Shah, 2018) the expertise of librarians and information professionals in collecting, managing secrets, acquisition, organization, retrieval, and dissemination of information needs to adapt to new trends and systems in the digital era.

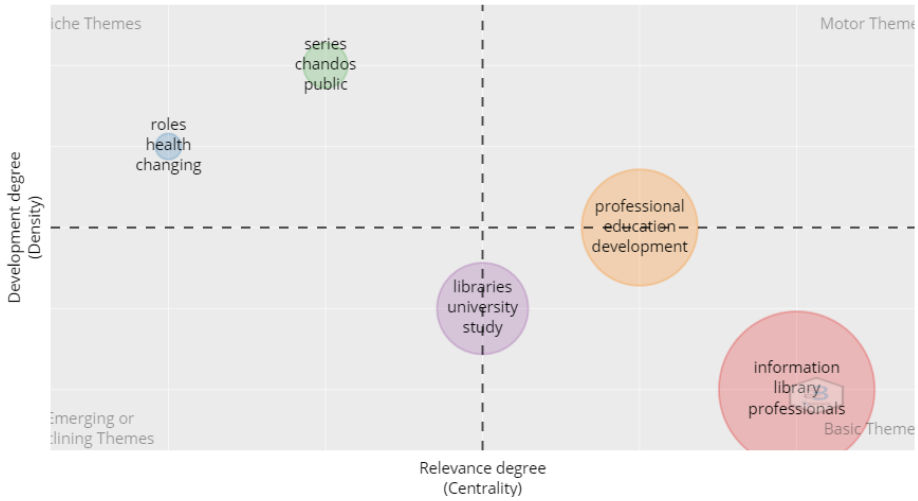

Figure 4. Thematic map of information professional studies
Source: processed in Bibliometrix (Aria & Cuccurullo, 2017)

Table 3 shows the term that occurs most often is “information” with 1110 repetitions and another term that occurs frequently is “library”. The term "professionals" became the third-largest term with 598 occurrences. The trend of topics in the study of information professionals during the last 20 years showed that in the first quarter (1999-2005) they were: managing, education, and guide. Meanwhile in the middle quarter (2006-2012): learning, service, and communication are the trends. Finally, the third quarter (2013-2020) includes university, library information system (LIS), and skills.

Tabel 3. Keywords frequency occurrence more than 46 times in profesional informasis studies

Rank	Keywords	Frequency	Rank	Keywords	Frequency
1	information	1110	11	management	76
2	library	984	12	knowledge	58
3	professionals	598	13	research	58
4	professional	468	14	university	54
5	science	290	15	role	53
6	libraries	144	16	services	50
7	education	138	17	study	49
8	development	119	18	skills	47
9	guides	94	19	technology	47
10	continuing	83	20	guide	46

Figure 5 shows the authors' collaboration network, where there are only two networks of three authors including 1) Tseng, Poulter, him and 2) Walton, Lewis, Varlejs. In addition, the rest is dominated by the collaboration of two authors (80%).

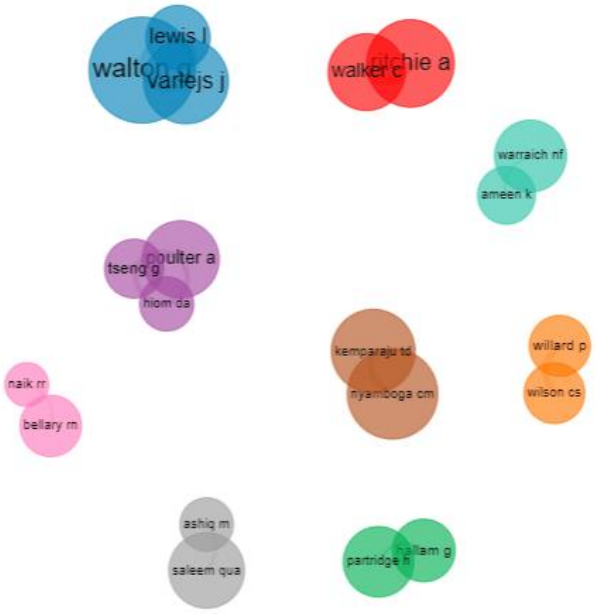

Figure 5. Author collaboration network
Source: processed in Bibliometrix (Aria & Cuccurullo, 2017)

5. CONCLUSION

This research had analyzed the development of the professional study of information in libraries and identified in detail the frequently occurring themes and terms, topic trends, and authors' collaborative networks. The results showed that 2011 and 2014 recorded the largest number of publications at 76 and 84 articles, respectively. In addition, the average growth rate related to publications among information professionals is quite high at 29% during the analyzed period. The top five most prolific authors by the number of publications include Graham Walton (39), Ann Ritchie (26), Clare Walker (22), Paul Genoni (19), and Blanche Woolls (14). This study illustrates that the productivity of writers in this field is still quite low because it is dominated by writers who only publish one article (85%).

Sources of publication were dominated by journal articles and the United States is at the top of the top 20 countries based on the number of institutions 32.41% and citations 29.18%. The study themes were divided into 4 major theme groups and the basic theme is the most frequently used. Then the term that most often appears was "information" with 1110 repetitions, technical terms such as digital, application, and internet also appear which indicate that the study of information professionals had adapted to systems in the digital era. Meanwhile, the topic trends in the first quarter (1999-2005) were more about practical issues such as managing and guiding. However, in the last quarter, the topic trend (2013-2020) showed more about the LIS system, skills, and higher education. Finally, this study showed an analysis of the social network of authorship, which is dominated by the collaboration network of two authors (80%).

6. ACKNOWLEDGMENT

The authors would like to thank the Director of Repository, Multimedia and Scientific Publishing (RMPI) and the Center for Data and Information Science Research (PRSDI) - the National Research and Innovation Agency for providing facilities to carry out this research.

DISTRIBUTION OF THE AUTHOR'S ROLE

Kamaludin: Writing-Original draft preparation, Supervision, Writing-Reviewing and Editing
Abdurrakhman Prasetyadi: Conceptualization, Methodology, Software, Visualization, Writing-Analysis and Discussion.

REFERENCES

Ahmad, S., Ameen, K., & Ullah, M. (2016). Needed soft skills and their status: Self-perceptions of university information professionals. *Pakistan Journal of Information Management and Libraries*, *18*(2), 75–90. https://doi.org/10.47657/20161811094

Antognoli, E., Avila, R. L., Sears, J., Christiansen, L. L., Tieman, J., & Hart, J. (2020). Reproducibility literature analysis - a federal information professional perspective. *IASSIST Quarterly*, *44*(1–2), 1–26. https://doi.org/10.29173/iq967

Aria, M., & Cuccurullo, C. (2017). bibliometrix : An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, *11*(4), 959–975. https://doi.org/10.1016/j.joi.2017.08.007

Bornmann, L., & Mutz, R. (2015). Growth rates of modern science: A bibliometric analysis based on the number of publications and cited references. *Journal of the Association for Information Science and Technology*, *66*(11), 2215–2222. https://doi.org/10.1002/asi.23329

Brochu, L., & Burns, J. (2019). Librarians and Research Data Management–A Literature Review: Commentary from a Senior Professional and a New Professional Librarian. *New Review of Academic Librarianship*, *25*(1), 49–58. https://doi.org/10.1080/13614533.2018.1501715

Burns, J. A. (2016). Role of the Information Professional in the Development and Promotion of Digital Humanities Content for Research, Teaching, and Learning in the Modern Academic Library: An Irish Case Study. *New Review of Academic Librarianship*, *22*(2–3), 238–248. https://doi.org/10.1080/13614533.2016.1191520

Carroll, B. C. (2012). From knowledge navigator and watson to star trek: The role of the information professional. *Information Services and Use*, *32*(3–4), 173–176. https://doi.org/10.3233/ISU-2012-0667

Chikonzo, A., Bothma, T., Kusekwa, L., & Mushowani, A. (2014). An assessment of the changing needs of information professionals in Zimbabwe. *African Journal of Library Archives and Information Science*, *24*(1), 107–118.

Gandia, R. M., Antonialli, F., Habib, B., Neto, A. D. M., Lima, D. A. De, Yutaka, J., Luiz, A., Nicolaï, I., Marçal, R., Antonialli, F., Habib, B., Neto, A. D. M., & Lima, D. A. De. (2017). *AUTONOMOUS VEHICLES : Scientometric and bibliometric studies To cite this version : HAL Id : hal-01652939*. *June*.

Garcia Marco, F. J., & Agustin Lacruz, M. del C. (2000). Educating the information professional of the 21st century: A ten-point proposal based on the Spanish context. *Education for Information*, *18*(2/3), 141–153.

Khan, F. D., & Ali, S. L. (2016). Changing Role of Library Professional as an Information Manager. *Pakistan Library & Information Science Journal*, *47*(2), 56–63. http://search.ebscohost.com/login.aspx?direct=true&db=llf&AN=115879261&site=ehost-live

Lens. (2022). *Search, Analyze and Manage Patent and Scholarly Data*.

Lunin, L. F. (1988). Education of the Information Professional: New Dimensions, New Directions. *Journal of the American Society for Information Science*, *39*(5), 348–361.

Maclean, G. (2006). Opportunity for change in the future roles for the health library and information professional: Meeting the challenges in NHS Scotland. *Health Information and Libraries Journal*, *23*(SUPPLEMENT 1), 32–38. https://doi.org/10.1111/j.1471-1842.2006.00683.x

Paul, R. J. (2001). Visualizing a Knowledge Domain ' s. *Ieee Computer Graphics And Applications*, 65–71.

Phinney, J., & Paterson, A. (2017). Roundtable: How do you explain to your family, your friends, and strangers what you do as an information professional? *Partnership: The Canadian Journal of Library and Information Practice and Research*, *11*(2), 10–12. https://doi.org/10.21083/partnership.v11i2.3889

Pollack, J., & Adler, D. (2015). Emergent trends and passing fads in project management research: A

scientometric analysis of changes in the field. *International Journal of Project Management*, *33*(1), 236–248. https://doi.org/10.1016/j.ijproman.2014.04.011

Quadri, G. O. (2012). Impact of ICT skills on the use of E-resources by information professionals: A review of related literature. *Library Philosophy and Practice*, *JUNE*, 1–8.

Shah, A. (2018). Role of Library and Information Professionals in Digital Environment. *Vidyawarta*, *February 2018*.

Singh, R., & Vorbach, J. (2017). Re-envisioning management education and training for information professionals. *Journal of Education for Library and Information Science*, *58*(2), 94–105. https://doi.org/10.12783/issn.2328-2967/58/2/4

Sridevi, T. R. (2014). Research Evaluation of Indian Journal of Cancer: A Bibliometric Study. *Research Journal of Library Sciences Res. J. Library Sci*, *2*(2), 2320–8929.

Tripathy, J. K., Patra, N. K., & Pani, M. R. (2007). Leveraging Knowledge Management: Challenges for the Information Professional. *DESIDOC Journal of Library & Information Technology*, *27*(6), 65–73. https://doi.org/10.14429/djlit.27.6.146

Turner, B. G. W. (2005). Shared governance from the perspective of the community college information professional. *Community and Junior College Libraries*, *12*(3), 17–47. https://doi.org/10.1300/J107v12n03_05