

Prosumer-behaviour of Chemistry Researchers: An Academic Librarian's Perspective

L.T. Kleinveldt

Abstract— Emerging technologies and Web 2.0 tools have changed the research practices of the researcher to become a prosumer. In the research cycle, the researcher plays different roles such as being a consumer, producer, and prosumer in the production of new knowledge. Universities and their libraries are moving more towards organisations that have adopted the Mcdonaldization phenomenon, making the university community prosumers. It is therefore ideal to explore the role of the researcher as a prosumer in the digital age. The purpose of this paper is to explore Chemistry researchers' role as prosumers at a university of technology in South Africa. Research profiles of two purposively selected chemistry researchers listed on Scopus versus their ResearchGate profiles were evaluated to explore prosumer-behaviour and whether Web 2.0 had any influence on research visibility. Findings provide the research community and academic libraries insight into the potential factors changing information-seeking behaviour and research practices.

Keywords— research, innovation, universities, prosumer.

I. INTRODUCTION

Visibility of research output is essential in the ranking of universities worldwide. The contemporary university is constantly transforming, and in the digital age is further described as a social network [7]. Networks are established by individuals within and outside the university, as is evident in many scientific publications produced by researchers of one university collaborating with researchers another university or industry. Observing the broader picture, universities build networks with different stakeholders through consortiums and agreements [7]. One example of such agreements are evident in the document delivery, inter-library loan services rendered by academic libraries worldwide to enhance the sharing of resources process in supporting research. And so these university networks continue to expand internally and externally with actors sharing common interests aligned to the university teaching and research goals. This means that a vast amount of information sharing is taking place, even more so in the digital age. Web 2.0 has contributed to the flow of information being more 'liquid' [4], [16], making the prosumer practice far more visible than ever before [12]. Emerging technologies and Web 2.0 tools have changed the research practices of the researcher to become a prosumer. In the research cycle, the researcher plays different roles such as being a consumer, producer, and prosumer in the production of

new knowledge. Universities and their libraries are moving more towards organisations that have adopted the Mcdonaldization phenomenon [17], making the university community prosumers. It is therefore ideal to explore the role of the researcher as a prosumer in the digital age. The term 'prosumer' was first used in the 1980s which is described as the combination of consuming and producing [19]. However it is argued that individuals have always been prosumers long before the emergence of Web 2.0 [18], especially taking the concept of 'invisible colleges' into consideration [6]. The Net Generation of students is described by Reference [11] as 'digital prosumers' since they embrace emerging technologies in developing projects. The activity of building new social networks in research is supported by Reference [7] statement that "the content of these online exchanges in the information society constitutes the social 'glue' that bonds socio-technical innovations applicable to the system". Therefore purpose of this paper is to explore Chemistry researchers' role as prosumers at a university of technology in South Africa. Research profiles of two purposively selected chemistry researchers listed on Scopus versus their ResearchGate profiles were evaluated to explore prosumer-behaviour and whether Web 2.0 had any influence on research visibility. The following section briefly discusses the background into the concept of prosumerism in the digital age where social media is said to be the enabler of prosumer behaviour.

II. BACKGROUND AND RESEARCH QUESTION

Chemistry is one of the oldest disciplines, forming the foundation that cuts across many fields. Therefore it is worth exploring what chemistry research practices entail and what makes the discipline fundamental to society. Chemistry is described as an activity conducted by scientists to explore what materials are made up of in order to ascertain the reasons particles react in a certain way based on various conditions, for example when heat is applied [5], [8]. In the past, scientists mainly conducted these experiments in silos, but over time these practices have shifted to far more collaborative projects, which to some extent led to the forming of 'invisible colleges' in physical spaces [6].

Considering the trends today, Social Networking Sites (SNS) are found to play an important role in current and collaborative research practices occurring in virtual spaces [2], [3], [20], and [15]. In the university context, the use of SNS are also referred to as Academic Social Networking Sites (ASNS) among researchers [2]. It is therefore noted that the role of researchers as prosumers in the creation of new science and knowledge relies on the individual marketing strategies designed, namely through research profiles created on SNS such as

L.T. Kleinveldt is the Faculty Librarian in Applied Sciences and Health & Wellness Sciences at the Cape Peninsula University of Technology, Cape Town, South Africa.

ResearchGate. Previous research conducted by Reference [12] found that the main SNS used by Chemistry researchers for research purposes is ResearchGate. Reference [2] also found in their investigation that researchers across faculties at Central Universities in Delhi mainly used ResearchGate to connect to other research scholars. However other research findings reveal that there are mixed feelings among some researchers about using SNS for research and that there is a perception that it could reflect negatively on their career [9]. Although studying researchers' profiles on SNS according to Reference [20], "helps organisations to better understand their employees", there is a gap in the literature on user-behaviour of SNS research communities. Therefore this paper explored the research output available on Scopus versus ResearchGate to understand the extent of prosumer-behaviour among two chemistry researchers based at a higher education institution in South Africa. In keeping relevant, academic librarians play a vital role in finding out what researchers need and want from the library in supporting their research [12], [10]. Therefore exploring research activities taking place via SNS is a different approach to providing additional support to research trends. Studying research patterns of chemistry researchers was found to assist academic librarians in making informed decisions about collection development and strategic planning [13]. The 'sleeping beauty' (SB) phenomenon, which refers to publications not cited for long periods of time before a sudden rise in recognition occurs, was found to be common in scientific research as revealed in the case of a scientometrics analysis of "Paul Hagenmuller's work on solid state chemistry" [1]. The reasons for SBs vary and occur quite often in the areas of physics and chemistry. The authors conclude that the "occurrence of SBs raises questions about the relevance of short-term citation-based metrics for the evaluation of scientific impact" [1]. Taking this into consideration, the main research question in this study is "what are the prosumer-behaviour strategies of chemistry researchers?" The following section describes the method used to collect data in an attempt to answer the research question.

III. METHODOLOGY

In an attempt to answer the research question in this study, data was collected by conducting a scientometric analysis of researchers in the field of Analytical Chemistry to understand prosumer-behaviour within the higher education sector. Scientometrics is described as a 'powerful' research method to investigate "scientific production quantitatively" [1], and found to be used extensively as well as effectively to understand research practices of scientists, especially in the chemistry field [1], [21]. The method of collecting data for this paper is based on Reference [14]'s approach, where data extracted from a bibliographic database is compared with SNS profiles of researchers to measure impact and activities. However in the current study research patterns of Analytical Chemistry researchers were explored by comparing the results extracted from the Scopus database and compared with researchers' profiles on one SNS, namely ResearchGate. For the purpose of the paper, the sample size was limited to two purposively selected Analytical Chemistry researchers (who are referred to as Researcher A and Researcher B) affiliated to a fairly young

university of technology in South Africa. The reason for the choice of these two researchers was to identify whether there are similarities or vast differences in prosumer-behaviour in their capacity as Analytical Chemistry researchers over the past 15 years. Data was analysed using EXCEL to interpret prosumer-behaviour of chemistry researchers in an attempt to provide academic librarians insight into prosumerism in the digital age in order to improve research support services.

IV. FINDINGS AND DISCUSSION

This section reports on the findings from Scopus versus ResearchGate in an attempt to answer the research question: "what are the prosumer-behaviour strategies of chemistry researchers?"

The first step was to evaluate the Scopus profiles of the two chemistry researchers selected in this study, focusing on the number of publications versus the number of citations, as well as the number of co-authors each researcher have been publishing with. Figure 1 represents the number of publications versus the number of times they were cited since the first publication in 1991 of Researcher A. It is evident here that Researcher A experienced the 'sleeping beauty' phenomenon between the period 2000-2009 as described earlier by Reference [1] to be quite common in chemistry and that the reasons vary. On the other hand, Reference [6] pointed out that the creation of new science and knowledge is not determined by the number of publications but rather by the number of times a publication is cited.

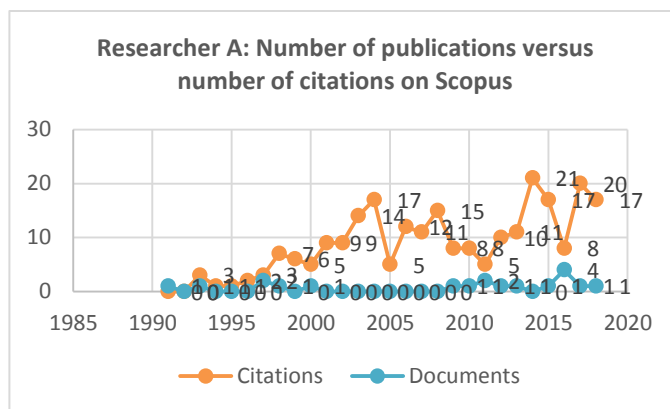


Fig. 1. Publications versus citations of Researcher A on Scopus

Figure 2 indicates that Researcher B experienced the SB phenomenon fewer times compared to Researcher A. The highest citations for both researchers occurred after 2010. However further analysis is needed to determine the reason for this.

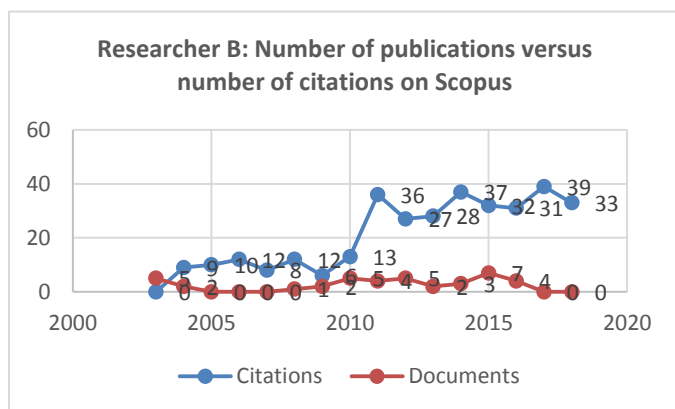


Fig. 2. Publications versus citations of Researcher B on Scopus
Both researchers' number of collaborators exceed their number of publications listed on Scopus as highlighted in Figure 3. It is in line with Reference [6]'s description of how chemistry research practices have shifted over time from working in isolation to more collaborative research.

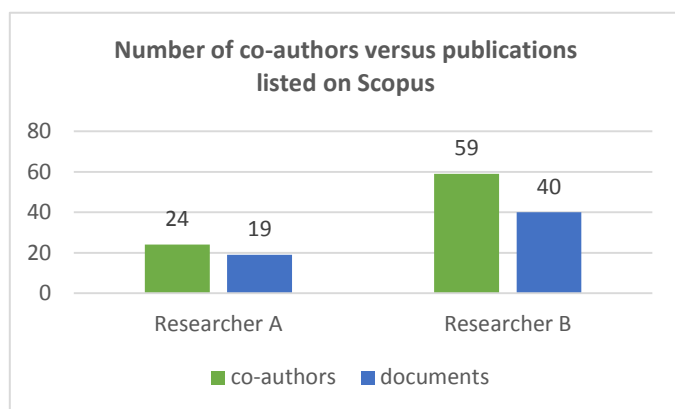


Fig. 3. Researchers' co-authors versus publications listed on Scopus

Figure 4 highlights that both researchers practice prosumerism as their number of outputs are higher in ResearchGate compared to Scopus above. The figures also reveal that citations and number of reads are quite high, and in line with research findings discussed earlier, that ResearchGate is the main SNS used among researchers [2], [12]. Individual marketing strategies are shown to be effective via ResearchGate as illustrated in Figure 4.

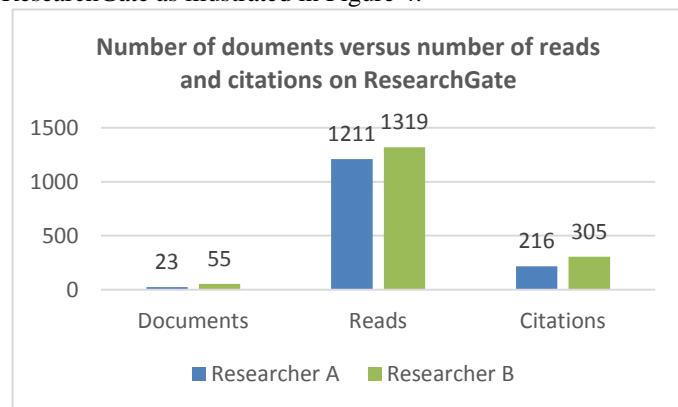


Fig. 4. Research output versus number of reads and citations via ResearchGate

Considering the research activities conducted by both chemistry researchers in this study confirms that ResearchGate is the enabler of prosumer-behaviour in the digital age as the results reveal in Figure 4 above. The visibility of research output has increased tremendously through the use of SNS in research.

V. CONCLUSION

This paper focused on investigating whether the rise of Web 2.0 increased prosumer-behaviour among chemistry researchers at a young university of technology in South Africa. Two researchers were purposively selected to compare their profiles on Scopus versus ResearchGate in an attempt to answer the research question which focused on what the prosumer-behaviour strategies of chemistry researchers are. The results confirm that ResearchGate is an enabler of prosumer practices among chemistry researchers. Although the study was limited to only two chemistry researchers, the findings provide insight for academic librarians to develop state-of-the-art research support services which speak to the prosumer behavioural trends of a university community.

REFERENCES

- [1] Aichouchi, A.E. and Gorry, P. 2018. Paul Hagenmuller's contribution to solid state chemistry: A scientometric analysis. *Journal of Solid State Chemistry*, 262 (2018): 156-163. <https://doi.org/10.1016/j.jssc.2018.02.003>
- [2] Asmi, N. A. and Margam, M. 2018. Academic social networking sites for researchers in Central Universities of Delhi. *Global Knowledge, Memory and Communication*, 67 (1/2): 91-108.
- [3] Baruffaldi, S.H., Maio, G.D., Landoni, P. 2017. Determinants of PhD holders' use of social networking sites: An analysis based on LinkedIn. *Research Policy*, 46 (4): 740-750. <https://doi.org/10.1016/j.respol.2017.01.014>
- [4] Bauman, Z. 2012. *Liquid modernity*. Cambridge: Polity Press.
- [5] Brescia, F., Arents, J., Meislich, H and Turk, A. 1975. *Fundamentals of chemistry*. New York: Academic Press.
- [6] Crane, D. 1972. *Invisible colleges. Diffusion of knowledge in scientific communities*. Chicago: The University of Chicago Press.
- [7] Figaredo, D. D. & Álvarez, J. F. Á. 2012. Social networks and university spaces. Knowledge and open innovation in the ibero-american knowledge Space1. *RUSC*, 9(1), 245-257.
- [8] Furse, A.J. and Rendle, G.P. 1975. *The pattern of chemistry*. London: Edward Arnold (Publishers) Ltd.
- [9] Greifeneder, E., Pontis, S., Blandford, A., Attalla, H., Neal, D. and Schlebbe, K. 2018. Researchers' attitudes towards the use of social networking sites. *Journal of Documentation*, 74 (1):119-136. <https://doi.org/10.1108/JD-04-2017-0051>
- [10] Hart, G. and Kleinveldt, L. 2011. The role of an academic library in research: researchers' perspectives at a South African University of Technology. *South African Journal of Library and Information Science*, 77 (1): 37-50. <https://doi.org/10.7553/77-1-65>
- [11] Jenkins, H. 2006. *Fans, bloggers and gamers: exploring participatory culture*. New York: New York University Press.
- [12] Kleinveldt, L. 2018. The role of libraries in support of academic research: a study of chemistry and chemical engineering at the Cape Peninsula University of Technology and the University of Bologna. Unpublished PhD thesis. University of Bologna, Italy.
- [13] Kleinveldt, L. and Booyesen, D. 2015. Collaboration and Social Networks between Chemistry Researchers: what does this mean for Academic Libraries? Poster presented at the 36th IATUL Conference. Hannover, Germany, 5-9 July 2015.
- [14] Martin-Martin, A., Orduña-Malea, E., Allon, J.M. and Delgado Lopez-Cozar, E. 2016. The counting house: measuring those who count. *Presence of Bibliometrics, Scientometrics, Informetrics*,

- Webometrics and Altmetrics in Google Scholar Citations, ResearcherID, ResearchGate, Mendeley & Twitter. EC3 Working Papers, 21 (19 January 2015): 1-60.
- [15] Park, B.K. and Calamaro, C. 2013. A Systematic Review of Social Networking Sites: Innovative Platforms for Health Research Targeting Adolescents and Young Adults. *Journal of Nursing Scholarship*. 45 (3): 256-264
<https://doi.org/10.1111/jnu.12032>
- [16] Ritzer, G. 2011. *Globalization: the essentials*. West Sussex: John Wiley & Sons Ltd.
- [17] Ritzer, G. 2004. *The McDonaldization of Society* (revised New Century Ed.). Thousand Oaks, CA: Pine Forge Press.
- [18] Ritzer, G., Dean, P. & Jurgenson, N. 2012. The Coming of Age of the Prosumer American. *Behavioral Scientist*, 56(4): 379-398.
<https://doi.org/10.1177/0002764211429368>
- [19] Toffler, A. 1980. *The third wave*. New York, Marrow.
- [20] Waheed H, Anjum M, Rehman M, Khawaja A. 2017. Investigation of user behavior on social networking sites. *PLoS ONE*. 12(2):1-19.
<https://doi.org/10.1371/journal.pone.0169693>
- [21] Zhao, Y. and Zhao, R. 2016. An evolutionary analysis of collaboration networks in scientometrics. *Scientometrics*, 107 (2016): 759-772.
<https://doi.org/10.1007/s11192-016-1857-x>



Lynn Tatum Kleinveldt, born in Cape Town, South Africa, obtained her PhD in Philosophy, Science, Cognition and Semiotics in 2018 from the University of Bologna, Italy.

She is currently a Faculty Librarian in Applied Sciences and Health & Wellness Sciences at the Cape Peninsula University of Technology in Cape Town, South Africa. Her latest publication is: Kleinveldt, L.T., Schutte, M. and Stilwell, C. 2016. Embedded librarianship and Blackboard usage to manage knowledge and support blended learning at a South African university of technology. *South Africa Journal of Libraries and Information Science*. 82(1): 62-74. Current and previous research interests include integrating emerging technologies such as mobile technologies and social robotics into reference services, research support services and Information Literacy.

Dr. Kleinveldt is currently serving as Standing Committee Member for the IT Section in the International Federation of Library Associations and Institutions (IFLA) for the term 2017-2019, and the Chair-elect for LIASA Higher Education Libraries Interest Group, 2018-2020.