

International Research Collaboration: A Working Model

Gaby Haddow

Dept of Information Studies, Curtin University, GPO Box U1987, Perth 6845 Australia,
G.Haddow@curtin.edu.au

ABSTRACT

Research collaboration has the potential to increase the productivity of researchers and the exposure of their work. International collaboration also develops personal networks across diverse cultures and contributes to an appreciation of different approaches to issues experienced by those in the field. In the current higher education environment, where productivity is an imperative and the expectations of academics are rising, effective research collaboration enables researchers to share the workload while enhancing their own research skills and performance. This paper discusses the nature of research collaboration, focusing on international collaboration. It reviews the literature about the drivers and motivations behind collaboration, as well as the key benefits. Research and commentary about international research collaboration and measures for assessing successful collaboration, is discussed. In addition, the main findings relating to barriers and other considerations in collaborative activities are reviewed. The paper concludes by describing a working model of international research collaboration in the library and information science field. Based on the author's involvement in two international research collaborations, links are drawn between research findings and a lived experience.

Keywords: international research collaboration

1. INTRODUCTION

In 2012, ten collaborators from across the world met in Limerick, Ireland, to present their own country's results of a collaborative study into the skills and competencies of reference librarians. This was the first time the collaborators had met as a group, despite having worked together for over six months. In October 2013, many of these (and several new) collaborators will meet in Istanbul to present the results of an investigation into the information literacy skills and behaviour of information studies students. For both collaborations, a cross-country analysis of findings and the single country analyses were undertaken, giving individuals involved the opportunity to publish at least two journal articles.

This paper will discuss the primary factors that contribute to successful outcomes of international research collaboration. It does so by reviewing the literature about research collaboration; discussing the importance of collaboration, measures of success, and the issues and influences involved collaborative research. The paper

goes on to describe the key features of the author's international research collaboration experience. The benefits of the collaboration are discussed to emphasise the value of a cross-cultural research experience and to encourage others to consider establishing similar research collaboration projects.

2. RESEARCH COLLABORATION

In attempting to define research collaboration, Katz and Martin (1997, p. 7) state that while it is a 'fuzzy area', collaboration usually involves:

- “(a) those who work together on the research project throughout its duration or for a large part of it, or who make frequent or substantial contribution;
- (b) those whose names or posts appear in the original research proposal;
- (c) those responsible for one or more of the main elements of the research.”

Two forms of research collaboration are defined by Melin (1996, as cited by Stuart, Thelwall & Harries, 2007, p. 233) as: "'analytical' cooperation which includes 'contacts, meetings, co-operational work, exchange of papers or other kind of information'; and 'operationalized' collaboration where research collaboration is manifested as coauthorship". van Raan (1997, p. 424) includes "exchange of researchers and students" and "organization of international conferences" in his description of collaborative research activities.

Evident in these definitions is that "collaboration is an intrinsically social process" (Katz & Martin, 1997, p. 4), and the body of opinion suggests that most collaborations begin informally.

2.1 Why Collaborate?

One of the major drivers for international research collaboration relates to science policy. Research funding agencies encourage and view favourably applications that involve collaborative work (Hoekman, Franken & Tijssen, 2010; Katz & Martin, 1997; Luukkonen, Persson & Sivertsen, 1992; Moed, 2005). The notion that collaboration is essentially good and 'more is better' is a common theme in the literature, as Lee and Bozeman (2005, p. 693) note: "there is a strong belief among policy makers and apparently most scientists that scientific collaboration has positive effects on scientific productivity". Aside from the issue of productivity, which is discussed in the next section, there are identified benefits from undertaking collaborative research.

Just as collaborations differ in terms of the form they take, so too do the benefits that may result from collaborative research. Like teamwork, collaboration "is greater than the sum of its parts" (Katz & Martin, 1997, p. 15) and has the potential to bring together a range of knowledge and skills to a project that would be unavailable to the sole researcher. This is particularly true of research that requires large and/or expensive equipment and facilities. Katz and Martin (1997) also note that an increase in the visibility of research may result from collaborations. Melin (2000, p. 38) surveyed collaborating authors, finding their needs were "material, knowledge-based or social" (p. 38) and often a combination of these. At its most basic, research collaboration is about 'something to gain', according to Melin (2000, p. 38). For developing or emerging nations, where the pool of researchers is likely to be smaller, the need collaborate can be more acute (Luukkonen, Persson & Sivertsen, 1992),

and Kim (2006, p. 231) describes the benefit of international research collaboration for emerging research countries as “not an indicator of research quality as such but a means to reach that quality”.

Benefits relating to perspective and individual rewards are also discussed in the literature. Katz and Martin (1997, p. 14) explain that the sharing and transfer of knowledge and skills may “be a source of stimulation and creativity”. This aspect of research collaboration is supported by Freshwater, Sherwood and Drury (2006, p. 297), who describe the “benefit in sharing methods and protocols, previously unique to one region ... has forced us to challenge our taken-for-granted assumptions, move towards fresh perspectives”. The potential for “intellectual companionship” and extending a researcher’s network are additional benefits noted by authors who have studied collaboration (Katz & Martin, 1997, p. 14; Freshwater, Sherwood & Drury, 2006).

2.2 Research into Research Collaboration

A substantial body of work exists for research collaboration. These studies have examined collaboration, at national and international levels, in order to identify influencing factors and to measure success. In many cases, a quantitative approach is taken and this is often based on science fields using co-publications and citations as data and outcome measures. Schubert and Braun’s paper (1990) appears to have led to a flurry of collaboration studies in the 1990s, but van Raan (1997, p. 424) points to the “pioneering work” of Francis Narin’s group in the 1970s. In particular a 1979 study that developed three ‘rules’ relating to international collaboration patterns. van Raan describes these rules as “still valid after almost 30 years” (p. 424); they are:

1. the more basic the field, the more international collaboration;
2. the larger the national research system, the smaller the international collaboration;
3. 'external' factors play a major role in international collaboration.

Supporting the third rule above, Luukkonen, Persson & Sivertsen (1992) found less developed countries looked to collaborate with developed countries and that some research fields, such as mathematics, collaborated more than others. Melin (2000) and Katz and Martin (1997) note the lower level of collaboration in humanities fields. The ‘external’ factors that influence international collaboration include physical proximity, (Hoekman, Frenken & Tijssen, 2010; Katz & Martin, 1997; Luukkonen, Persson & Sivertsen (1992) - even in a geographically small area such as Europe, length of experience, experience in other workplaces (van Rijnsoever & Hessels, 2011, p. 469), and “social distance” (Katz & Martin, 1997, p.5).

According to Katz and Martin (1997, p. 5), Lotka’s law of scientific productivity influenced a body of work that examined whether productive authors collaborate more than less productive authors. They concluded that this work “seems to indicate that high productivity (in terms of published output) is indeed correlated with high levels of collaboration”. Narin’s research is again referred to, this time in relation to the impact of collaboration on citations to papers; that is, “internationally co-authored papers are cited up to twice as frequently as single-country papers” (Katz & Martin, 1997, p. 6). van Raan (1997) investigated this issue, wondering if self-citations were

a major contributor to a higher number of citations to co-publication. He concluded that self-citations alone do not account for the increase in citation rates.

In seeking to determine why citation rates tend to increase with collaboration, Moed (2005) found that citation impact varied depending upon the number and combination of countries involved in a co-publication, and the order of authors on a paper. His study indicated (as did Glanzel, 2001), that authors from countries with high citation rates may be “negatively affected” when co-authoring with a country with a low national citation rate, particularly if they are listed second in author order (Moed, 2005, p. 289).

A different approach was taken by Stuart, Thelwall and Harries (2007, p. 233), who noted the limitations of using co-authorship “as a proxy for collaboration”. Their investigation of web links from 125 universities in the United Kingdom to industry and government found that although there were links that reflected collaboration, the majority of links from universities did not reflect collaboration.

Research collaboration in the Asia-Pacific region was the subject of a study by Haustein, Tunger, Heinrichs and Baelz (2011). The authors note the trend, which has also occurred worldwide, of increasing numbers of co-publications between 1992 and 2007. Over the period, China had displaced Japan as the largest publisher, followed by Australia, Japan, South Korea & Taiwan. Reflecting the second ‘rule’ established in 1979 (van Raan, 1997), the strongest publishing countries tend to have a lower proportion of international collaborations than the weaker publishing countries. Only Australia displays a different trend with high publication numbers and high international collaboration (40%) (Haustein, et al., 2011, p. 736). According to the researchers “inner-Asian scientific collaboration has developed more than the global average” (p. 744) and is now firmly visibly in the bibliometric universe.

Throughout the literature about research collaboration there is acknowledgement of the problems relating to measuring collaboration. This is due in part to the measures that are applied, the varying forms of collaboration, and the difficulty of measuring informal collaborations (Haustein, et al., 2011; Katz & Martin, 1997; Luukkonen, Tijssen, Persson & Sivertsen, 1993). However, the attraction of this field of research remains strong. This is demonstrated in the recently developed tool (by the Centre for Science and Technology Studies, Leiden University), University-Industry Research Connections (2013) scoreboard, which uses Web of Science data to measure the proportion of papers co-authored by a university and industry across all disciplinary fields.

2.3 Research Collaboration: Considerations and Barriers

The rewards of research funding and the attraction of higher productivity and citations do not come without challenges. Cost, in terms of time, is a significant factor in collaborative research (Freshwater, Sherwood & Drury, 2006; Katz & Martin, 1997). Collaborations differ from individual projects in the time required to organize administrative processes, maintain interpersonal relationships, and manage research activities. Freshwater, Sherwood and Drury (2006, p. 301) specifically note the importance of establishing a clear understanding of how the collaboration will manage “intellectual property, authorship of papers and presentations”. They also emphasise the “centrality of effective leadership” (p. 298) and “the role of diversity and respect and resolving and accommodating differences” (p. 299).

Difference is a theme of Bammer's paper (2008, p. 876), which provides some pragmatic discussion about research collaboration and takes the view of collaboration as "harnessing differences". The author discusses the importance of "integrating diverse relevant contributions", "setting defensible boundaries", and "gaining legitimate authorization". An earlier paper (Amabile, et al., 2001, as cited by Sargent & Waters, 2004, p. 310) focused on collaborative activities described three "determinants of collaborative success ... collaborative team characteristics, collaborative environment characteristics, and collaboration processes". In addition, Sargent and Waters (2004, p. 317) discuss interpersonal processes and the importance of trust, previous experience and liking/attraction between collaborators.

Despite the range of communication and information technologies available, Melin (2000, p. 39) is convinced that a collaboration is more successful if participants have the opportunity to meet in person. There may be an association between this and the influence of geographical proximity on productive collaboration, as discussed above, however Bozeman and Gaughan (2011) found that strategies relating to locating partners in the same country or with the same language were not predictors for increased collaboration.

As library and information science (LIS) is a field in which females vastly outnumber males, it is interesting to consider the role of gender in collaboration. Very little difference has been found when the number of collaborations by men and women is examined (Bozeman & Gaughan, 2011; Rijnsoever & Hessels, 2011), although the women in Bozeman and Gaughan's study collaborated at slightly higher rates.

This review of the literature suggests collaboration often originates from informal contact and that maintaining interpersonal communication is important; so much so that some authors believe meeting in person is a vital component for success. The benefits of collaboration include sharing skills and tools, as well as the potential for increased impact (measured by papers and citations) of research. Participants can benefit from working with a diverse group, such as that which comes with an international collaboration, particularly in relation to challenging assumptions and approaches, and in extending research networks. For countries that are smaller and developing their research community, international collaborations facilitate access to a wider range of partners. However, physical proximity appears to remain important to the establishment of a collaborative research project.

Successful outcomes are more likely in a collaboration where: difference is viewed positively and integrated into the collaboration; there is effective leadership; team and administrative processes that support collaboration are in place; and all partners have a clear understanding of how the intellectual property resulting from a collaboration will be managed.

3. INTERNATIONAL COLLABORATION IN PRACTICE

Many of the points discussed above were pivotal to successful outcomes in the author's experience of two international collaborations in the LIS field. Each collaboration was more than the sum of its parts, however individual differences and approaches were respected and encouraged alongside the collaborative activities. The primary factors that contributed to the success of these collaborations were: 1.

personal contacts; 2. an identified project, research instrument and outcomes; 3. flexibility; and 4. leadership.

An informal meeting and personal contacts were the foundation of the first collaboration, which investigated the knowledge, skills and attributes of reference librarians. It was conceived at a conference where a Turkish academic approached an American researcher with a suggestion that her US study could be extended to include international data so as to examine cross-cultural differences. The collaboration model involved co-opting individuals from different countries to carry out a study and to then analyse the combined results.

Following this first meeting, the two academics began contacting potential collaborators. Many were already known to them or were recommendations from others they knew. In terms of recruiting collaborators, it was noted that 'cold calls' or invitations to people who were unknown either directly or indirectly were least successful. The final group included collaborators from 14 countries, the majority of which were European (reflecting the importance of existing networks and, possibly, geographical proximity).

After meeting at a conference in 2012, where the single country results were presented, most of the collaborators agreed to work on a second project which explored the information literacy skills of LIS students. The opportunity to meet in person at the conference was an important step towards establishing the second collaboration. It enabled deeper discussion about the project than emails generally permit and fostered a greater sense of teamwork as a result of social activities and when collaborators presented their country findings in the same conference session. Additional collaborators joined the second project, with a total of 17 individuals from as many countries involved.

A key factor in managing the collaborations and their processes were clear objectives and stated research outcomes. In both cases, an earlier study had developed the research question and a data collection instrument. These provided an excellent framework for the collaboration. The research instruments were self-directed questionnaires and therefore suitable for conversion to online surveys. This form of survey also reduced the potential for major differences between collaborators to creep into the study. The collaborators were provided with a time-frame for completing their country data collection, basic analysis, and contributing their data to the international study.

There was also an established approach to publications and presentations. At the outset, collaborators were aware that the collaboration leader(s) would draft a multi-country paper and that each collaborator would be listed as co-authors and given the opportunity to comment on the draft. Collaborators were encouraged to submit abstracts to the same conference to present their country results and to write up their individual study results for publication. On this basis, collaborators could expect to gain two journal articles and a conference paper from participating in the collaboration.

As the literature demonstrates, difference can both benefit and challenge research collaboration. When 14 and 17 collaborators from across the world are working together these differences include language, local contexts, individual objectives, knowledge and skills. An important factor in the success of the collaborations has

been to acknowledge these differences and allow a degree of flexibility, within a collaborative environment that had specified objectives. For example, English was the agreed language of communication and joint publication, but individual collaborators were encouraged to translate the surveys into their own language to maximize responses. In addition, minor amendments to the surveys were permitted to ensure relevance to local contexts such as position descriptions and university grade scores which differed across the collaborating countries. The activities conducted in each country could be tailored to the administrative requirements of the collaborator's workplace. This meant it was possible for collaborators to undertake activities related to local requirements, such as gaining ethics approvals, and to run the surveys at a time that was most suitable, within the general time-frame agreed. While these more administrative aspects of the collaborations demonstrate the way in which difference was integrated into the projects, collaborators also benefited in a personal, creative and intellectual perspective. Collaborators learned from the different approaches taken in the conference presentations and subsequent country study papers, and their experience has led to a deeper understanding of the cultures and professional lives of their collaborators.

Finally, the collaborations have relied heavily on strong leadership. The leaders established the collaborations' objectives, processes and time-lines. They were also responsible for sourcing the research instruments and gaining consent for these to be used in the collaboration. Importantly, the leaders provided technical support in relation to the online surveys. In both cases, survey software was selected by the leaders and a member of the leadership team developed a survey site for each collaborator. There are a number of advantages to this approach; it reduces the potential for collaborators to miss project deadlines due to lack of time and/or expertise in creating online surveys, and it ensures the data is collected in a consistent and comparable form.

The leading collaborators created an environment in which there was a strong framework that provided support, boundaries and expectations of collaborators combined with sufficient flexibility for the individuals involved in the project. It is a model that has been very successful in both collaborations and has resulted in extended networks, increased research outputs, and an improved awareness of how the LIS field operates in countries across the world. Whether it will result in higher citation numbers is yet to be determined.

REFERENCES

- Bammer, G. (2008). Enhancing research collaborations: Three management challenges. *Research Policy*, 37, 875-887.
- Bozeman, B. & Gaughan, M. (2011). How do men and women differ in research collaborations? An analysis of the collaborative motives and strategies of academic researchers. *Research Policy*, 40, 1393-1402.
- Centre for Science and Technology Studies, Leiden University. (2013). University-Industry Research Connections 2013. Available online at <http://www.socialsciences.leiden.edu/cwts/research/uirc-scoreboard-2013.html> (accessed on 16 May 2013)

- Freshwater, D., Sherwood, G. & Drury, V. (2006). International research collaboration: Issues, benefits and challenges of the global network. *Journal of Research in Nursing*, 11(4), 295-303.
- Glanzel, W. (2001). National characteristics in international scientific co-authorship relations. *Scientometrics*, 51(1), 69-115.
- Haustein, S., Tunger, D., Heinrichs, G., & Baelz, G. (2011). Reasons for and developments in international scientific collaboration: Does an Asia-Pacific research area exist from a bibliometric point of view? *Scientometrics*, 86, 727-746.
- Hoekman, J., Frenken, K. & R.J.W. Tijssen (2010). Research collaboration at a distance: Changing spatial patterns of scientific collaboration within Europe. *Research Policy*, 39, 662-673.
- Katz, J.S. & Martin, B.R. (1997). What is research collaboration? *Research Policy*, 26, 1-18.
- Kim, K.W. (2006). Measuring international research collaboration of peripheral countries: Taking the context into consideration. *Scientometrics*, 66(2), 231-240.
- Lee, S. & Bozeman, B. (2005). The impact of research collaboration on scientific productivity. *Social Studies of Science*, 35(5), 673-702.
- Luukkonen, T., Persson, O. & Sivertsen, G. (1992). Understanding patterns of international scientific collaboration. *Science, Technology, & Human Values*, 17(1), 101-126.
- Luukkonen, T., Tijssen, R.J.W., Persson, O. & Sivertsen, G. (1993). The measurement of international scientific collaboration. *Scientometrics*, 28(1), 15-36.
- Melin, G. (2000). Pragmatism and self-organization: Research collaboration on the individual level. *Research Policy*, 29, 31-40.
- Moed, H.F. (2005). *Citation analysis in research evaluation*. Dordrecht: Springer.
- Sargent, L.D. & Waters, L.E. (2004). Careers and academic research collaborations: An inductive process framework for understanding successful collaborations. *Journal of Vocational Behavior*, 64, 308-319.
- Schubert, A. & Braun, T. (1990). International collaboration in the sciences, 1981-1985. *Scientometrics*, 19(1-2), 3-10.
- Stuart, D., Thelwall, M. & Harries, G. (2007). UK academic web links and collaboration: An exploratory study. *Journal of Information Science*, 33, 231-246.
- van Raan, A.F.J. (1997). The influence of international collaboration on the impact of research results. *Scientometrics*, 42(3), 423-428.
- van Rijnsoever, F. J. & Hessels, L.K. (2011). Factors associated with disciplinary and interdisciplinary research collaboration. *Research Policy*, 40, 463-472.
-