Non Profit Organizations' Use of Tools and Technologies for Knowledge Management: A Comparative Study

1. Introduction

Non-Profit Organizations (NPO) are those organizations that demonstrate five key characteristics – i.e., they are: organized as institutions; private, and not a part of government; self-governing (controlling and managing of) their activities and procedures; not distributing profit, (with any income generated used to meet organizational objectives); and, have voluntary participation in some ways (Anheier, 2005). NPOs make significant contributions to national economies. In Canada, there were nearly "161,000 nonprofit and voluntary organizations and registered charities" in 2003 (Hall et al., 2005 p.8 (Catalogue no. 61-533-XIE)); by 2007, non-profits accounted "for 2.5% of Canada's gross domestic product… [increasing] to 7.0% when hospitals, universities and colleges are included" (Haggar-Guenette et al., 2009 p.5 (Catalogue no. 13-015-X); Jackson and Clemens, 2014). In Australia, 59,000 NPOs were considered economically significant making $43 billion contributions to Australian GDP in 2006-07 alone (Productivity Commission, 2010). NPOs add both social value to their communities (Lettieri et al., 2004) and economic value to country (e.g., Jackson and Clemens, 2014). NPOs strive to meet the needs of their clients in a society or community (Mahmoud and Yusif, 2012). Like their For-Profit Organization (FPO) counterparts, NPOs make significant non-monetary contributions to nation building and society (e.g., campaigning on various health issues). Indeed, there are a number of parallels between NPOs and FPOs. For example: NPOs, like FPOs, are knowledge-intensive organizations (Renshaw and Krishnaswamy 2009); NPOs need access to knowledge about operating environments and their communities (e.g., clients, donors, volunteers and partners) and, NPOs need a complete understanding of their operational environments (e.g., a strong understanding of their markets and customers, stakeholders and competitors, and the regulatory environment in which they are operating) (Rathi et al., 2014a; Rathi et al., 2016). In spite of such parallelism between the two key organizations types, NPOs are not well studied from a knowledge management (KM) perspective.

NPOs also experience many challenges unique to their organizational contexts, including monetary challenges (e.g., reduced government funding), increasing competition, challenges to recruit and retain volunteers, and the need for effective outreach programs to connect to stakeholders (Gregory and Rathi, 2008; Mahmoud, and Yusif, 2012). These constraints have implications for NPOs' overall effectiveness and efficiency. The non-profit sector needs to collect and analyze stakeholder information to develop appropriate plans to meet their needs (Mahmoud, and Yusif, 2012). As Benbya et al. (2004) note, "[k]nowledge is often the basis for the effective utilization of many important resources" (p. 202); however, the type and knowledge utilization and use will vary by organization (Gallupe, 2001). The existing KM literature is primarily FPO-focused; this body of literature notes that people, processes and technology are the three critical elements of KM-based investigations (Armistead, 1999; Bhatt, 2001). Technology is an enabler of effective and efficient KM by playing "an important role in effectuating the knowledge-based view of the firm by enhancing the firm's capability to manage

the knowledge it possesses" (Benbya et al., 2004 p. 202). Technology not only helps to reduce barriers (e.g., temporal and spatial) but also provides effective ways to capture, organize and disseminate knowledge (Armistead, 1999; Bhatt, 2001; Lee and Choi, 2003). In this way, technology is an important facet of any KM framework (e.g., Al-Aama, 2014; Kushwaha and Rao, 2015; Lee and Lim, 2015).

As noted previously, there are some parallels between NPOs and FPOs; however, NPOs have unique knowledge needs in areas related to (for example), communities, trends, events, policies and legislation, best practices and experiential knowledge (Rathi et al., 2014a; Rathi et al., 2016). Considering the uniqueness of NPOs' work contexts, the lessons learned from FPO-KM research is not always applicable to meet the KM related needs of the organizations operating in NPO domains (see Ragsdell et al., 2014). Thus, the non-profit sector requires in-depth investigation of KM-related issues so that findings from such research can guide development of NPO-appropriate KM practices to foster effective and efficient workplace strategies similar to developments in FP contexts (see Bose (2004) and Bontis (2002) for examples related to Texas Instruments, Chevron and Ford Motor Company). In addition, the overall KM-related research in the non-profit sector is not as rich or deep as studies of FPOs, resulting in a limited understanding of the use of tools and technologies for KM practices in the non-profit sector. Given NPOs' unique challenges (e.g., limited finances), organizations operating in this sector may not have enough means (in comparison to FPOs) to access and use sophisticated tools and technologies to meet KM-related needs. Thus, a focus on NPOs' technological needs from a KM perspective addresses a significant gap in current research.

This paper reports results of an exploratory study to provide insights into the use of tools and technologies by NPOs in Canada and Australia. Although many studies explore these topics in FPO contexts, very few studies address experiences in NPOs. Thus, this paper fills a significant gap in the KM-NPO-technology domain. This paper serves as a companion piece to other publications from this research, which focused on the use of social media tools, exclusively, in NPOs for KM purposes (see Forcier et al., 2013a; Forcier et al., 2013b; Given et al., 2013; Rathi et al., 2014b). The paper presents a broad overview of tools and technology use in non-profit organizations for KM. The paper makes a significant contribution by adding to the small but growing body of literature on KM-NPOs; further, the paper serves as a catalyst for future investigations of technological issues in NPOs from KM perspectives. Finally, the paper presents an array of tools and technologies that other NPOs may wish to consider using to improve KM-related practices.

2. Literature Overview

The literature on the KM-NPO domain, overall, is not as rich as that which exists for the KM-FPO domain; however, there are studies that have explored a range of issues related to KM practices in NPOs (e.g., Ebrahim (2002); Gilmour and Stancliffe (2004); Hume and Hume (2008); Corfield et al. (2013); Gregory and Rathi (2008); Huck et al. (2011); Soakell-Ho and Myers (2011); Ragsdell and Jespon (2014); and, Stadler and Fullagor (2016)). For example, Ebrahim (2002) conducted a study to understand the strategies used by NPOs and their funders to control the flow of information. Gregory and Rathi (2008) and Huck et al. (2011) conducted pilot research to identify the knowledge needs of small-scale NPOs. Corfield et al. (2013) conducted a longitudinal on KM initiatives in three different NPOs. Soakell-Ho and Myers (2011) examined the KM related issues in the health and disability sector. Ragsdell and Jespon

(2014) examined knowledge sharing practices among festival volunteers. There has been limited in-depth investigation on the use of technologies and tools by NPOs, across sectors, for KM purposes; further, none to compare practices across countries to provide a broader social context to best understand global NPO practices.

Information tools and technologies are considered KM enablers (López et al., 2009; Bose 2004; Tyndale, 2002) with technology implementation leading to better KM practices and processes (Serban and Luan, 2002). Chua (2004) noted that "[t]he power of technology in supporting knowledge management (KM) activities is widely recognised" (p. 87). Technology plays a crucial role in (for example) enhancing and enabling KM-related activities such as capturing, sharing and organizing of knowledge (Mack, et al., 2001; Sher and Lee, 2004; Lee and Hong, 2002; Bhatt, 2001; Alavi and Leidner, 1999; Benbya et al., 2004). However the majority of KM-technology discussions in the literature emanate from the FPO domain, with limited application to NPO environments. The focus of the following overview is on the use of technology in KM domain as discussed in the literature, followed by examples from the NPO domain, specifically.

There is no one particular tool or technology that supports organizational KM activities; however, a range of systems can be used to manage knowledge (Alavi and Leidner, 2001). Lindvall et al. (2003) noted that it is a challenge to draw distinctions "between what is called information technology (IT) and tools for KM" (p. 140). The majority of tools used in the FPO KM domain are tools designed for information management but that have been adapted to manage KM-related activities (Gallupe, 2001). Organizations may use a suite of tools and technologies to manage knowledge (Meso and Smith, 2000; Benbya et al., 2004; Binney, 2001). The choice of a particular tool is dependent on such factors as organizational size or existing technology infrastructure (Alavi and Leidner, 1999). Researchers have identified many technologies that are used to manage knowledge in different contexts (see Gallupe 2001; Marwick 2001; Liao 2003; Lee and Hong 2002; Alavi and Leidner 2001; Tyndale 2002). Examples of tools and technologies used in KM include: intranets; portals; search engines; databases; document and content management systems; groupware; intelligent agents; expert systems; customer relationship management systems; help desk systems; and, data warehouse and mining tools (ibid). These tools and technologies are used for different purposes and aspects of KM. For example, Gallupe (2001) noted that tools like databases and programming languages are level 1 tools "that provide the fundamental building blocks for a KMS [Knowledge Management System]" (p.63) whereas document management and groupware applications are level 2 or KM generators that can be used to generate specific KMSs. Other researchers noted the specific use of above mentioned tools in KM context. For example: Jackson (2001) noted the use of document management systems to organize information; Benbya et al. (2004) and Bhatt (2001) noted the use of email, chats, intranets, and discussion boards for knowledge generation and distribution; Alavi and Leidner (2001) found database management systems and query languages being used for storage, organization and retrieval purposes; and; Lee and Hong (2002) identified tools and technologies such as group support systems, email and video conferencing being used for knowledge sharing. In addition, many researchers point to the usefulness of data/text mining tools for knowledge discovery or knowledge generation (Shaw et al., 2001; Wang and Wang, 2008; Ngai et al., 2009; Lee and Hong, 2002).

There is also an emerging paradigm on the use of social media tools (e.g., wikis, blogs, social networking platforms) to manage knowledge. These tools are low cost and also include social

networking features generally not available in other tools used in the KM domain. Such social features allow users to collaborate with others to create and share knowledge (Razmerita et al., 2009). For example, wikis enable collaborative authorship and support acquisition, organization, storage and distribution of knowledge (Grace, 2009). A number of studies have started to emerge, particularly in the FPO sector, related to social media tools. Chua and Banerjee (2013), for example, studied Starbucks' use of social media (e.g., Facebook, Twitter and Foursquare) to manage customer-related knowledge. The authors found that these tools provide "knowledge for customers and keeps them updated on its [Starbucks'] latest products, activities and events. Starbucks draws knowledge from customers to analyze their expectations, behaviors and preferences" (p.245).

Studies of the use of technology in the NPO-KM domain are limited, but there are some that demonstrate the use and applicability of tools for KM purposes. Examples include: the adoption of technology by the Annie E. Casey Foundation for managing knowledge (Capozzi et al., 2003); the use of an intranet system by Voluntary Services Overseas (VSO) as part of its KM strategy (Gilmour and Stancliffe, 2004); and, recommendations to use wikis, blogs and YouTube videos to meet operational, technical and personal knowledge needs of NPO users in a community-based bicycle workshop (Huck et al., 2011). Matschke et al. (2012) argued "Web 2.0 technologies have various features in common with NGOs [/NPOs] that have a strong potential of turning them into a successful instrument of knowledge management especially for NGOs [/NPOs]" (p.161). Yates and Paquette (2011) examined the KM and social media landscape in the context of a Haitian earthquake, and concluded, for example, that social media can play important roles in sharing and reusing knowledge.

Overall, there are a large number of studies on technology and tool use for KM; however, the vast majority of these studies focus on the FPO perspective. Although elements of these studies can inform research in the non-profit sector, it is difficult to transfer ideas and concepts (e.g., KM practices in project management) into the non-profit sector based on FPO-related findings (Ragsdell et al., 2014). The NPO domain must be studied on its own as there are significant differences from the for-profit sector, including culture, financial support, operations, legal obligations, management needs and organizational structure (Hume et al., 2012). These differences have significant implications for NPO KM activities (Ragsdell et al., 2014). For example, data mining is a great KM application for knowledge discovery; however, a large number of NPOs, particularly small and medium-sized NPOs, will have neither the need nor capacity to use such applications. There is limited understanding of the current state of technology use to manage knowledge in the non-profit sector. This paper fills this gap by documenting technologies and tools used in NPO-KM domain.

3. Research Design

Two nation-wide surveys were conducted, in Canada and Australia, to understand NPOs' KM needs and perspectives. The survey had a number of questions on different KM-related themes, such as the importance of different types of knowledge (e.g. community/client, staff/volunteers), ways of sharing and gathering knowledge (e.g., formal and informal in-person interaction), and tools used in the organization to manage knowledge. An initial pilot study (conducted with 16 NPOs in Canada) and a review of published KM related literature (e.g., Pan and Scarbrough, 1998; Rus and Lindvall, 2002, Razmerita et al., 2009) informed the development of the survey questions in the current study. The surveys were administered using Survey Monkey and NPOs in both countries were invited to participate via email; potential

respondents were identified using the non-profit registry provided by the Canada Revenue Agency (http://www.cra-arc.gc.ca) and the publically-available directory of Australian non-profits compiled by Connecting Up (www.connectingup.org). A unique URL was generated for each email ID to ensure only one response per email invitation. The survey content was edited to suit the particular context (e.g. spelling conventions, geographic locations such as Capital/Metropolitan City in Australia vs. Local City in Canada). The NPOs surveyed were involved in different domains, such as animal welfare, culture and arts, religion, health, education and research, and social services. The Australian Survey had one extra category "conservation and environment" that was not in Canadian survey to meet the local needs. Overall, there were 2,700 Canadian NPOs and 1,356 Australian NPOs that submitted the survey; however, not all organizations responded to all questions.

The findings presented here are based on a specific question focusing on the use of tools for managing knowledge in NPOs. The responses to the use of tools were analysed in the context of demographics gathered from respondents, including areas of operation (e.g., animal welfare, culture and arts) and size of NPO (i.e., very small, small, medium, large, very large and miscellaneous). Respondents were given 10 options on a pre-defined list of possible technologies/tools used for KM practices along with an open-ended "other" question, to allow respondents to provide specific examples of other tools (or to provide new, contextual details) not covered in the pre-defined list. The pre-defined list was developed both by drawing upon the published literature (e.g., Marwick, 2001; Tyndale, 2002; Lindvall et al., 2003; Benbya et al., 2004; Gregory and Rathi, 2008; Liao et al., 2011) and through the discussion among research team members.

In all 1,635 Canadian and 815 Australian NPOs responded to this question. The "other" option received more than 300 combined responses from both Canadian and Australian NPOs. In the Canadian survey, 1,417 and 1,275 respondents (who answered the technology question) identified their NPOs' sector area and size, respectively; in the Australian survey, 742 and 727 respondents (who answered the technology question) identified their NPOs' sector and size, respectively. The collected quantitative data from the list of tools were analyzed using simple descriptive and inferential statistics. Chi-square tests were conducted to analyze the impact of sector and size on the use of specific tools for KM activities. The examples of tools and technologies in the qualitative data contributed by respondents in the "other" category were analyzed using a thematic analysis approach (Braun and Clarke, 2006). The thematic analysis identified the key categories of tools that NPOs used and are discussed in sub-section 4.4.

4. Key Findings and Discussion

As an exploratory study, this paper presents the overall landscape of KM tools used by NPOs in Canada and Australia. The results will inform future research on the specific use of tools by NPOs, as well as the practical supports needed to support KM development in the NPO sector. Where qualitative comments are presented, these are referenced to the country of the respondent and their anonymous ID number (e.g., CA-69 or AU-81).

The findings are divided into four major sub-sections. The first sub-section presents an overall view of the NPO-KM tools and technology landscape, followed by two sub-sections that present findings based on NPOs' size and sector in relation to the use of tools and technologies. The final sub-section presents an analysis of qualitative data, which respondents added in an 'other' category of the survey.

Overall NPOs' KM Tools and Technologies Landscape

The data presented in this section were analyzed based on 1,635 Canadian and 815 Australian responses to the technology and tool use question in the surveys. There were nine pre-defined tools and technologies categories, plus an "Other" category for tools identified by respondents. The categories are as follows, as presented on the Figures (and collapsed into an "All Technologies" in the appended Tables): physical and print document; public website; commercial productivity software; low-cost/no-cost cloud computing services; internal website; open source content management software; low cost/no-cost productivity software; enterprise content management software; commercial cloud computing services; and, other tools.

One of the most popular tools used by NPOs in both countries was non-computer based in nature – i.e., physical, print documents, with over 95% of respondents identifying this as a key tool (See Figure 1 and Figure 2). For example, in providing further details in the qualitative comments, respondents described the use of a "binder of all past newsletter in print and of all news media clippings" (CA-203) and "Physical archive storage" (AU-50). The vast majority of NPOs in both Canada (86.1%) and Australia (87.9%) used public websites to support KM activities. For example, respondents mentioned the "[Canada Revenue Agency] website" (CA-187); "Related organizations' websites (they have links to our brochure)" (CA-99); "Internal Site" (AU-63); and, "existing community websites" (CA-121). The use of commercial productivity software (e.g., MS Office) was the next largest category, with 77.5% of Canadian respondents and 80.4% of Australian respondents mentioning these tools. However, the specific tools used may not be known; for example, one respondent stated that they used "[w]hatever program volunteers have on their PC. Organisation PC has Microsoft" (AU-81).

In addition, nearly half of the respondents (Canada 49.4% and Australia 50.6%) used low-cost or no cost cloud-based computing services such as "Dropbox" (CA-69) or "Google Docs and Apps" (CA-72). One respondent stated, "Dropbox is used for information sharing among Board members" (CA-85). However, a very small percentage of respondents in both countries (i.e., Canada 6.1% and Australia 9.4%) used commercial cloud computing services, like Xerox Cloud.. Two respondents noted that they were "in the process of purchasing Commercial cloud computing services but do not have it yet" (CA-159) and "Onedrive for document storage. Not yet in the hands of the volunteer committee!" (AU-88). This may be an emerging area of use in the future as such tools become more widely available.

One significant result was the low use of open source based products like content management software (Canada 24.3% and Australia 24.5%) and productivity software (Canada 16.3% and Australia 15.5%). Two respondents mentioned the use of specific tools of this type: "own cloud - open source service similar to Drop Box" (AU-22) and "[w]e use LibreOffice as office suite; we use Zikula CMS" (CA-57). Finally, a small number of NPOs (Canada 11.8% and Australia 14.2%) used enterprise content management software and other enterprise-wide software applications such as "Integrated Library System (Synphony)" (CA-19), "ERP system (inventory management system that has some limited CRM capability)" (AU-6) and, "AKA [to manage governance schemes]" (CA-56).

These findings suggest that non-technological solutions like physical and print documents also play important roles in managing knowledge in NPOs. Other organizations' public websites are important sources of information and knowledge and should not be ignored by NPOs in setting their KM strategies. In addition, cloud computing-based technological solutions, particularly low-cost/no-cost tools, are emerging as technological options for NPOs to meet their

needs for KM practices. However, commercial cloud computing services are not as popular among NPOs given that such services have financial implications, a matter of significant consideration in NPOs in general. The findings related to the use of open source-based productivity software is surprising because one might expect that NPOs, often faced with limited financial resources, would be drawn to these products; however, this was not the case. Such low levels of use could be due to a lack of familiarity with these tools, with usability issues, with the steep learning curve needed to use available open source productivity tools, and/or with a lack of human resources to customise these tools to meet the NPOs' specific needs. This finding requires further, in-depth investigation to identify the reasons of low usage of open source-based solutions, particularly with productivity software.

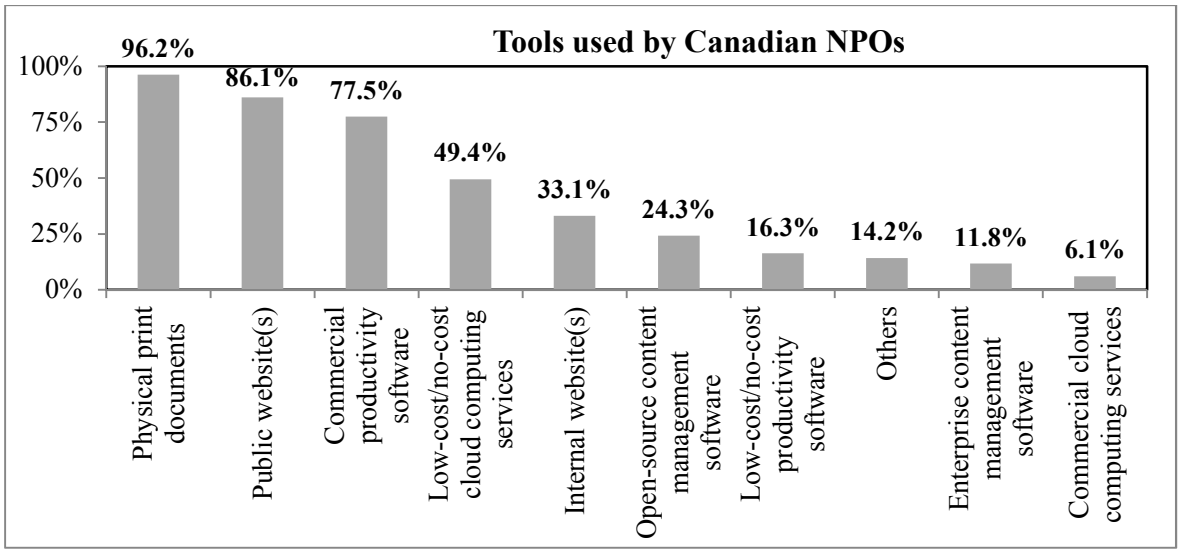

Figure 1. Tools used by Canadian NPOs

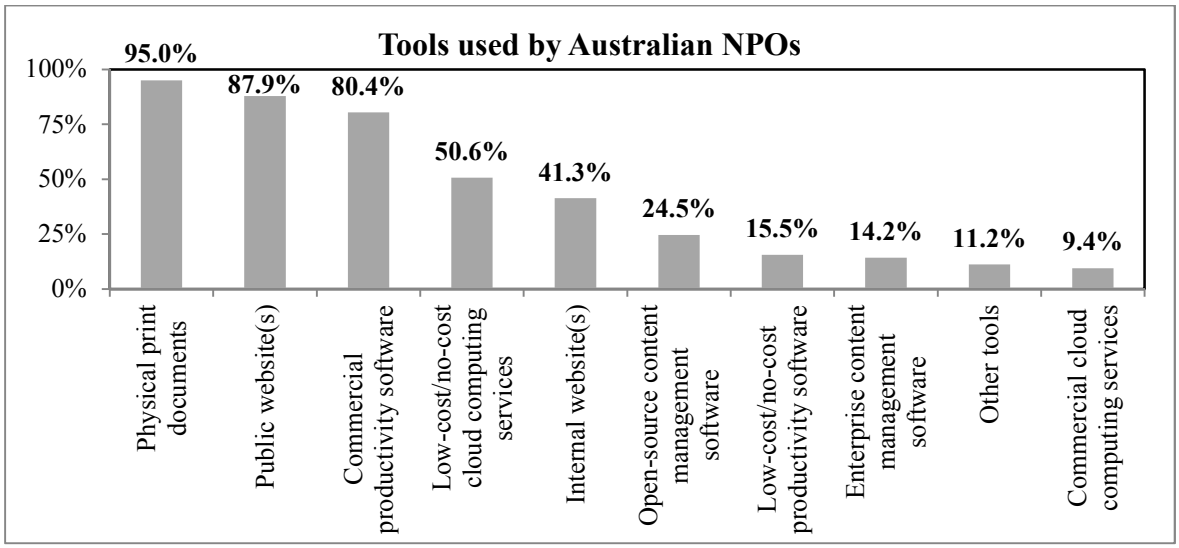

Figure 2. Tools used by Australian NPOs

4.1 Size and KM Technologies

Figures 1 and 2 presented overviews of the tools used in NPOs in the two countries. These data were further analyzed to explore how the various sizes of NPOs (i.e., very small, small, medium and other) in both the countries affected the tools used for KM activities (see Table 1 and Table 2). As noted in the Research Design section, 1,275 Canadian respondents and 727 Australian respondents identified NPOs' size. The sizes of NPOs for analysis purpose were divided into four broad categories i.e., very small, small, medium and others. The "Other" categories include all NPOs that identified themselves as large, very large and miscellaneous. The rationale for combining these was due to the small number of data points in these categories (e.g., the overall combined responses from large, very large and miscellaneous NPOs were 47 (3.7%) and 50 (6.9%) for Canada and Australia, respectively. Notable findings from the size-wise analyses are discussed in this section.

One of the key findings from the dataset is that 'very small' organizations had relatively lower use of tools for KM activities across almost all categories in both countries; the only exceptions were for 'low-cost and/or no cost productivity software' and 'other tools' in Australia where these categories had relatively higher values. The use of physical and print documents was one of the most popular approaches to support KM activities across all sizes of organizations in both countries. The use of public websites (i.e., those external to the NPO) was also popular for all organizations; however, one notable difference was that medium-sized NPOs in Australia had higher usage of these sources. Another key finding includes the use of intranets, which was relatively low in 'very small' NPOs in both countries as compared to other sized organizations. Commercial cloud computing services (e.g., Xerox cloud computing) and commercial productivity software packages (e.g., MS Office) were used more often in medium-sized NPOs in both countries as compared to other categories and organization sizes. Also, low-cost/no-cost productivity software had lower usage than commercial productivity software. In Canada, low-cost/no cost usage ranged from 12.4% for very small NPOs to 23.4% for other NPOs, while in Australia, the range was 12% for other NPOs to 16% for very small NPOs. In Canada, commercial productivity software usage ranged from 69.9% for very small NPOs to 90.9% for medium-sized NPOs, with 74.7% for very small NPOs and 89.7% for medium-sized NPOs in Australia.

Table 1. Tools used by Different Size Canadian NPOs

Tools Used by Canadian NPOs (↓) / NPO Size (→)	Very Small	Small	Medium	Other
Physical print documents	94.6%	96.4%	97.7%	91.5%
Public website(s)	78.2%	89.2%	92.0%	95.7%
Commercial productivity software	69.9%	81.5%	90.9%	83.0%
Internal website(s)	21.6%	36.1%	49.1%	55.3%
Low-cost/no-cost cloud computing services	38.6%	57.8%	55.4%	55.3%
Enterprise content management software	5.6%	10.4%	25.7%	21.3%
Open-source content management software	17.8%	27.9%	29.7%	27.7%
Commercial cloud computing services	2.9%	7.2%	12.0%	6.4%
Low-cost/no-cost productivity software	12.4%	17.3%	16.6%	23.4%
Other tools	10.8%	14.5%	21.1%	21.3%

Table 2. Tools used by Different Size Australian NPOs

Tools Used by Australian NPOs (↓) / NPO Size (→)	Very Small	Small	Medium	Other
Physical print documents	92.2%	97.5%	95.7%	94.0%
Public website(s)	81.9%	88.5%	96.6%	92.0%
Commercial productivity software	74.7%	83.9%	89.7%	88.0%
Internal website(s)	26.0%	41.9%	58.1%	62.0%
Low-cost/no-cost cloud computing services	42.0%	56.3%	55.6%	50.0%
Enterprise content management software	5.0%	14.0%	24.8%	36.0%
Open-source content management software	19.9%	28.3%	26.5%	24.0%
Commercial cloud computing services	5.3%	9.0%	19.7%	12.0%
Low-cost/no-cost productivity software	16.0%	14.3%	15.4%	12.0%
Other tools	13.5%	9.7%	10.3%	8.0%

Chi-square tests were also conducted to understand if the size of the organization had any impact on the use of tools for KM activities. The data were analyzed using various permutations and combinations of the NPO sizes within each individual country (See Table 5 in Appendix A for calculated χ^2 value and related p-values). Analysis was also done at the inter-country level to compare NPOs of similar sizes to see if there was any difference in tools used between the two countries (See Table 6 in Appendix A for calculated χ^2 value and related p values). Some of the key findings from such analysis are:

Canadian and Australian NPOs

a) The size of NPOs (i.e., very small, small, medium and others) did impact the use of tools for KM activities in both countries. The p-values for both countries were significantly lower (i.e., 4.9E-10 for Canada and 1.2E-06 for Australia) than the 5% level of significance (See Row 1 in Table 5 in Appendix A). The data were further analyzed for sensitivity by excluding 'other tools' category from the analysis and the p-value still remained significantly lower and close to '0' (2.1E-10 for Canada and 2E-06 for Australia) (See Row 2 in Table 5 in Appendix A). Thus, there is sufficient evidence to conclude that the size of NPOs has an impact on the use of tools for KM activities.

b) Additional analyses were conducted to assess if there was any significant difference between very small, small and medium-sized NPOs in both countries on the use of tools for KM activities. The p-values (including sensitivity analysis by removing the 'other tools' category) were, again, very low and close to '0' (e.g., for very small, small, and medium sized NPOs and 'All Technologies' used including other tools, the p-value was 2.4E-11 for Canada and 6.5E-06 for Australia) (See Row 3 and Row 4 in Table 5 in Appendix A). Thus, there is sufficient evidence to conclude that the size of NPO has impact on the use tools in KM activities in very small, small and medium-sized NPOs.

c) Chi-square tests were also conducted on 'very small' and 'small' NPOs, which found significant differences in the use of KM tools in both countries. The p-values were lower than the level of significance at 5% (i.e., 4.3E-05 for Canada and 0.0036 for Australia) (See Row 5 in Table 5 in Appendix A). In addition, there was no significant difference between medium-sized and other types of NPOs in the use of tools in both the countries. The p-values were very high (0.960 for Canada and 0.936 for Australia) for both countries (see Row 6 highlighted in grey in Table 5 in Appendix A). The sensitivity analysis done by removing the

'other tools' category reinforced that there was no difference between medium-sized and other organizations in the use of tools for KM practices (see Row 7 in Table 5, Appendix A).

Canadian vs. Australian NPOs

The inter-country analysis of the data showed that there was no significant difference between the same sized NPOs in both countries and the use of tools for KM activities. For example, the p-value for 'very small' sized NPOs in Canada and Australia is 0.688; the p-value for 'small' sized NPOs is 0.492 and the p-value for 'medium' sized NPOs is 0.412. All these p-values are significantly higher than the 5% level of significance. In addition, the p-values for sensitivity analysis (after removing 'other tools') led to no change in the conclusion. The p-values were higher than the 5% level of significance. Thus, this analysis demonstrates that similar sized NPOs in both countries used similar types of tools for KM activities. All the computed Chi-square and the p-values are in Table 6 in Appendix A.

4.2 NPO Sector and KM Tools and Technologies

The survey data were analyzed from sectoral perspective as well. Table 3 and 4 provide an overview of different tools used by NPOs operating in different sectors. The analysis of data was done only for respondents who provided sector-based information for their NPO and also answered the technology-related survey question. As noted under Research Design, 1,417 Canadian respondents and 742 Australian respondents met these criteria. The "Other" category includes NPOs that could not identify themselves in the pre-determined list of sectors.

As noted in the "Overall NPOs and KM Tools Landscape" section, physical print and documents was one of the most popular approaches used by NPOs in KM activities, followed by use of public websites. This trend remained the same when the data were analyzed by sector in both countries. There was limited use of commercial cloud computing services across most sectors for KM activities. The adoption of these tools ranged from as low as 0% for animal welfare in Australia, to a high of 12.5% for religion-related NPOs; the only exception was for international aid organizations in Australia where the usage was high, at 40%. The use of commercial productivity software (e.g., MS office) was also high across all sectors in both countries as compared to low cost or no cost applications. This is surprising considering that NPOs face many financial constraints, making open source software tools possible alternatives to licensed software. However, this could be due to a lack of familiarity and/or the need for staff experience to support implementation of many open source tools. This finding is also contrary to data in both countries that show a higher level of use of low cost or no cost cloud computing services such as Google Docs. The lowest level of use in this tool category (i.e., 25% by the animal welfare sector in Australia) was almost equal to the maximum value of use of low cost or no cost productivity software (i.e., 25.9%). Finally, the survey also found lower use of enterprise content management software across NPOs in all sectors in both countries.

The survey data was further analyzed and chi-square tests were conducted to assess whether the sector of NPOs (e.g., animal welfare, education and research) had any impact on the use of tools and technologies in KM activities. The Chi-square statistics and the p-values of these tests are included in Appendix A in Tables 7 and 8. The statistical analysis suggests that the sector of NPOs had no impact on the use of tools for KM activities in both countries. The p-values were relatively higher than the 5% level of significance for both countries (e.g., the p-value is 0.2449 for Canadian NPOs for all nine tools plus 'other tools'). The data were further analyzed for sensitivity by excluding the 'other tools' category from the analysis; the p-value remained

relatively higher than 5% (e.g., the p-values is 0.144 for Canadian NPOs). In the Australian context the animal welfare sector was combined with the "other" sector category due to the low response rate from this sector (See Table 8 in Appendix A). The p-values in such cases were still higher than 5% level of significance. Thus, there is sufficient evidence to conclude that the NPO sectors had no impact on the use of tools in KM activities.

Table 3. Tools used by Canadian NPOs in Different Sectors

Tools (→) / **Sector (↓)**	Physical print documents	Public website	Commercial cloud computing services	Low cost / no cost cloud computing services	Internal website	Open source content management software	Low cost / no cost productivity software	Enterprise content management software	Commercial productivity software	Other tools
Animal welfare	96.60%	93.10%	6.90%	44.80%	27.60%	27.60%	10.30%	6.90%	79.30%	10.30%
Community	95.90%	71.10%	0.80%	36.40%	29.80%	17.40%	13.20%	7.40%	63.60%	12.40%
Culture and Arts	96.20%	91.00%	4.60%	53.70%	24.80%	28.40%	15.10%	8.70%	75.40%	15.30%
Education and Research	96.60%	83.60%	9.00%	58.20%	36.20%	27.70%	17.50%	11.90%	75.70%	15.80%
Health	94.90%	88.40%	10.90%	45.70%	43.50%	23.20%	13.00%	13.80%	82.60%	13.80%
International Aid	88.90%	94.40%	0.00%	83.30%	33.30%	38.90%	22.20%	16.70%	77.80%	16.70%
Religion	96.30%	77.80%	3.70%	44.40%	14.80%	11.10%	25.90%	7.40%	77.80%	22.20%
Social services	97.90%	84.50%	7.30%	45.30%	39.80%	21.90%	15.20%	15.80%	83.60%	12.20%
Other	92.50%	82.40%	5.30%	45.50%	24.10%	20.30%	16.60%	10.70%	76.50%	12.80%

Table 4. Tools used by Australian NPOs in Different Sectors

Tools (→) / **Sector (↓)**	Physical print documents	Public website	Commercial cloud computing services	Low cost / no cost cloud computing services	Internal website	Open source content management software	Low cost / no cost productivity software	Enterprise content management software	Commercial productivity software	Other tools
Animal Welfare	87.50%	100.00%	0.00%	25.00%	75.00%	25.00%	12.50%	0.00%	62.50%	0.00%
Community	94.70%	81.90%	6.40%	51.10%	27.70%	22.30%	20.20%	1.10%	71.30%	10.60%
Conservation and Environment	88.60%	88.60%	8.60%	62.90%	25.70%	42.90%	25.70%	11.40%	77.10%	11.40%
Culture and Arts	97.00%	95.50%	3.00%	58.20%	20.90%	28.40%	19.40%	7.50%	80.60%	16.40%
Education and Research	96.30%	80.10%	7.40%	48.50%	50.00%	18.40%	14.00%	16.90%	80.90%	9.60%
Health	90.60%	84.40%	10.90%	50.00%	45.30%	15.60%	10.90%	12.50%	75.00%	14.10%
International Aid	100.00%	100.00%	40.00%	80.00%	20.00%	50.00%	20.00%	20.00%	90.00%	20.00%
Religion	100.00%	87.50%	12.50%	66.70%	45.80%	25.00%	12.50%	20.80%	87.50%	0.00%
Social Services	95.50%	89.00%	12.30%	43.20%	46.50%	23.90%	10.30%	21.30%	89.00%	7.70%
Other	94.00%	90.60%	10.10%	47.70%	38.30%	25.50%	14.80%	13.40%	82.60%	14.10%

These findings are useful to both researchers and practitioners as they document the similarities and dissimilarities between NPOs based on size and sectors of operation. Such comparisons are particularly important to understand because if there are more similarities and less contrast between NPOs operating in two similar countries (e.g., with similar economic development patterns), then these findings may be transferable to NPOs operating in similar global environments. In addition, these findings serve as baseline for comparing findings from NPOs operating in very different social environments (e.g., in countries that are less economically developed). They also provide direction for future research to investigate the factors impacting the adoption of tools and technologies in NPOs of different sizes or operating in different sectors. The findings provide insights for KM practitioners (and NPOs, directly) on the set of tools that are popular in organizations of different sizes and operating in different sectors. Thus, these findings will prove useful for other NPOs who are considering technological options to support their KM-related needs.

4.3 Specific Tools and Technologies used by NPOs in Canada and Australia

Respondents from both Canada and Australia gave a number of examples of specific tools used for KM activities in the 'Other' option of the survey question. These examples were analyzed using a qualitative thematic analysis approach that focused on the topics that emerged from the participants in the study. Individuals' responses were sorted into higher-level categories of tools to better understand the set of technologies used by NPOs to meet their KM needs. Overall, NPOs use a number of tool and technology types including communication, social media, collaborative, document/content management, database, project management and various specific applications; however, these categories are neither exclusive nor exhaustive. These categories provide a starting place, arising from the evidence gathered in this study, which can be developed further through future research in the NPO sector. Many tools discussed in this section can be used in different ways and may therefore be listed in more than one category. The purpose of the paper is not to create exclusive categories but to present a landscape of tools and technologies as used in KM related activities by NPOs to inform both NPOs that want to use tools to meet their KM needs and to guide future research. Each sub-section heading presented here is a high-level analytic theme identified based in the qualitative dataset as given by respondents from both countries. The findings are discussed in the context of the existing published literature to provide evidence for the importance and relevance of each set of tools.

4.3.1 General Communication Tools

Maiers et al. (2005) noted that "[c]ross-organizational sharing, or communication among multiple departments within an NGO, is a vital component of program planning and organizational success" (p.85). Thus, communication is central to effective and efficient functioning of both FPOs and NPOs, with communication tools allowing sharing of knowledge within and/or outside the organization. The survey findings suggest that NPOs in both countries use various communication tools, including email (e.g. respondent CA-35; CA-51; AU-14). Some respondents stated the use of "gmail" (AU-74) or "gmail account" (AU-54) as a specific example of an email application they used. In addition, the respondents also suggested the use of other communication tools such as "SMS [Short Message Services]" (AU-91), "Forums" (CA-27), "Google groups" (CA-41; AU-90), "Cisco Jabber" (AU-2) and "Electronic diaries" (AU-1). The content of such tools means that they can serve as repositories of explicit knowledge (Lindvall et al., 2003).

4.3.2 Social Media Tools

Social media tools (e.g., blogs, Twitter, Facebook) aid communication, dissemination and knowledge sharing (Razmerita et al., 2009; Yates and Paquette, 2011). These tools enable the exchange of ideas, facilitate collaboration, augment social interactions, (ibid) and "harness collective intelligence" (O'Reilly, 2007 p.22). The data analysis revealed that NPOs in both countries use various social media tools. For example, respondents from Canada identified the use of photo sharing websites like "Smugmug" (CA-52) and "Flikr" (CA-63). Respondents also mentioned the use of other social media tools like Facebook (CA-17, CA-26, AU-32, AU-74), Twitter (CA-69, CA-107), LinkedIn (CA-69), Google+ (CA-69), YouTube (CA-164, AU-23), Hootsuite (CA-69, AU-72), and wikis (CA-38).

4.3.3 Collaborative Tools

Collaboration is central to KM activities (Whelan and Carcary, 2011) and authors like Clarke and Cooper (2000) describe KM as a collaborative endeavour, with success tied to the use of collaborative approaches adopted by organization. Collaboration leads to the enhanced sharing of knowledge and ideas. For example, Edge (2005) noted in the context of public sector KM that collaborative work helped teachers/literacy coordinators to enhance instructional practices and have better understanding of challenges experienced in other units. The importance of collaboration is nicely summed up by Chase (1997) who said "[i]n its simplest form Knowledge Management is about encouraging people to share knowledge and ideas to create value-adding products and services" (p.83). Technology can play crucial role in reducing spatial and temporal barriers, and enhancing collaboration in an organization. In addition to the collaborative tools mentioned in other sections here (e.g., see general communication or social media tools), respondents also mentioned using the following collaborative tools: "wikispaces" (CA-38, CA-39), "Diligent Boardbooks Software" (CA-40), "water-wheel.net (the Tap)" (AU-29), "Huddle" (CA-34), "Shared Google Docs" (CA-72), and Cisco Jabber (AU-2)..

4.3.4 Document and Content Management Systems

Document Management Systems (DMS) / Content Management Systems (CMS) support KM activities as they act as knowledge repositories and allow for storage, searching, indexing and retrieval, which are crucial for capturing, organizing, accessing and sharing of knowledge (Alavi et al., 2005; Lindvall et al., 2003). These systems, for example, support "explicit-to-explicit knowledge conversion" and can be useful in finding critical information such as identifying expert from the authorship of a document (Lindvall et al., 2003; p.140). The data analysis reveals that NPOs in both countries use such systems. For example: one of the respondents (CA-57) highlighted the use of "Zikula CMS" which is an open source CMS application for managing websites (http://zikula.org/). Another respondent (CA-201) suggested the use of Wordpress, which can be used to create websites and blogs (https://wordpress.com/). An Australian respondent highlighted the use of "GoLive" but they plan to change to "Joomla" (AU-78). Two Canadian organizations highlighted the use of the SpeedCommander14 file manager system (CA-31), and Islandora (CA-177), the digital management system.

4.3.5 Databases and Data Storage Systems

Storage is one of the critical steps in KM activities. For example, Alavi and Leidner (2001) noted KM systems are a group of IT-based applications that support various KM activities, including storage. Lindvall et al. (2013) identified tools such as file servers and email as important infrastructure-layer IT tools. Dave and Koskela (2009) noted that there is strong likelihood of knowledge being lost if it is not captured and stored for re-use. Thus, storage of

information and knowledge is important for future use, and this can be done using various resources. The data analysis revealed that NPOs use various low cost to sophisticated devices and applications to capture and store information. Examples included: "usb sticks, cds, dvd's" (AU-20), "[p]hysical archive storage" (AU-50) including "filing cabinets" (CA-222) and binders (CA-203; CA-125), "Internal server" (CA16; AU-58)), and "shared hard drive" (CA-11) or "Shared folders in server" (AU-59). In addition, some NPOs used online (or cloud computing-based) storage solutions such as "[o]nline storage with daddy.com" (CA-36), "[s]hared Google Docs" (CA-72), "Dropbox" (CA-85), "Microsoft SkyDrive" (CA-148) and "Onedrive for document storage" (AU-88).

Databases are considered first or "early generation" KM solutions (Marwick, 2001 p.826). They provide the technological base for the storage of information and knowledge and are the backbone of a large number of IT tools and applications (Liao, 2003) including CMS, blogs and other advanced applications like data mining. NPOs surveyed in this study used databases or equivalent applications to manage information and knowledge. Some specific examples included: "File Maker electronic data base" (CA-20), "database FilemakerPro" (AU-3), customized/internal database (CA-22, CA-196; AU-56, CA-211), and others such as Microsoft Access Databases (CA-210).

4.3.6 Constituent Relationship Management Software

Constituent Relationship Management (CRM) software enables an organization "to better manage, track and steward its constituents" (Grattan, 2012 p.iv). FPOs use these systems to manage relationships with customers; they maximize revenue and profit by identifying key customers, understanding them, and identifying ways to best meet their needs (Bradshaw and Brash, 2001; Stefanou et al., 2003; Gebert et al., 2003). By using CRM, organizations manage various types of knowledge: for the customer (e.g., knowledge about products that a customer wants); about the customer (e.g., knowledge about customer purchase history); and, from the customer (e.g., learning from the customer to improve service offerings) (Gebert et al., 2003). CRM-based KM systems enable collection of customer or constituent-related data, which can then be used to understand purchase behaviour and preferences (Romano Jr., 2000). Thus, NPOs can make effective use such tools to effectively and efficiently manage relationships with donors, funders and community members. The findings from the data suggest that a number of NPOs are using CRMs or equivalent products to manage constituents. Examples of some of the specific tools include: donor or constituent application (CA-23) such as "eTapestry" (CA-8; CA49); "Sumac" (CA-13; CA-54); "Raisers Edge" (AU-17; AU-67); and, "DonorPerfect Online Donor management Software" (CA-156).

4.3.7 Email-Based Marketing Tools

NPOs use direct marketing approaches for raising funds and expanding memberships and/or donor databases. Email-based marketing tools provide opportunities to communicate and to conduct outreach with constituents in an economical way (Castronovo and Huang, 2012). Like FPOs, NPOs use email as a part of their direct marketing approach to reach out to their constituents as noted by Agaraj (2013) in context of NPOs operating in Albania; NPOs also use email to connect with volunteers (Voida et al., 2012). Modern CRMs have direct marketing capabilities but all email-based marketing tools may or may not have the same capabilities as a CRM. Email-based marketing tools can support KM activities indirectly, such as through sharing of information and knowledge with constituents. The findings from the data revealed that NPOs used tools such as: "Constant Contact" (CA-3; CA-5), Vertical Response (CA-101), and

MailChimp (CA-46; CA-53; AU-21; AU-33). These products have features such as email templates, automated responses, advanced analytics and many can be integrated with CRM and CMS.

4.3.8 Project Management Applications

Disterer (2002) argued, "projects are accepted to be learning intensive organizational forms" (p.512). People working on projects gain wide range of knowledge in numerous areas such as experience using new tools, detailed knowledge about procedures and processes and ways to deal with external entities (e.g., government bodies, contractors, etc.). Thus, it is crucial to manage knowledge created through project work for future re-use (Disterer, 2002). Leseure and Brookes (2004) noted that project management is one of the key areas in which KM can play an important role as information and knowledge created from one project can be used in other projects. NPOs in both countries used project management applications such as: "zoho project manag[e]ment software" (CA-42), "5 PM online project management" (CA-75), "Podio" (CA-232), "Trello" (Au-45), and "JIRA for issues and small projects" (AU-61).

4.3.9 Various Management Applications

There are other tools and technologies used by NPOs to manage knowledge, including some, as noted by Alavi and Leidner (2001), that "[w]hile IT [information technology] does not apply [directly] to all of the issues of knowledge management, [but] can support KM in sundry ways" (e.g., locating an expert and analysis of transactional data to know about customers) (p.114). The survey respondents suggested the use of many other applications, including:

(i) *Financial and accounting management tools*: "Sage 50 Simply Accounting" (CA-1), Quickbooks (CA-10; CA-169), "MYOB" (AU-18), and "Financial Edge" (CA-28).

(ii) *Human resource management tools*: "HRIS" (CA-25), "TimeTrax" (CA-145), and "HRMS human resources data base" (CA-162).

(iii) *Event management tools*: "Camp Brain" (CA-28), "Eventbrite" (CA-91) and "Active Network (Class Facility Booking System)" (CA-145).

(iv) *Publishing software / platform*: "Adobe InDesign" (CA-55), "Blurb publishing" (CA-55), "Scoop-it" (AU-80) and "Issu" (AU-80).

(v) *Domain Specific Applications*: "Stone Orchard Software-Cemetery Management Program" (CA-97); Past Perfect software (CA-33; CA-47); Fedora Commons (CA-177); Moodle (CA-7; AU-9; AU-26); and Teamsnap (AU-82).

(vi) *Other tools*: NPOs used a range of other tools such as scheduling software, like Google Calendar (CA-30) and Doodle (CA-53); productivity software, such as Open Office (CA-132) and Microsoft Office (CA-124); survey implementation tools such as Fluid Survey (CA-53) and Survey Monkey (CA-91; CA-179; CU-21); web applications, such as Team App (AU-43), and assistive technologies such as "Power Talk (AU-13), "Dragon naturally speaking" (AU-13), and SpokenText (CA-213).

This discussion focuses primarily on first generation or Level 1 and Level 2 (McElroy, 2003; Gallupe, 2001) KM tools as used by NPOs for various KM activities. Certainly, many of the listed tools can be described as information management tools; but, as noted in the literature review section, these tools have been adapted for KM practices, and can be the backbone for KM-related activities to "support KM in sundry ways" (Alavi and Leidner, 2001 p.114). In addition, these examples of the types of tools/technologies used by NPOs map well onto the

knowledge needs of NPOs that have been identified previously in the literature. For example, an earlier publication from this project (Rathi et al., 2014a; Rathi et al., 2016) identified a number of knowledge needs of NPOs such as knowledge about community and knowledge about funding sources including donors; from this current analysis of tool use, tools such as Sumac and Donor Manager would be useful for these knowledge needs. Lettieri et al. (2004) also identified NPOs' needs as including "accounting/administrative knowledge" and "[f]und raising/public relation management (PRM)/marketing knowledge" (p. 24-25); tools such as Quickbooks and MailChimp would be useful to support these needs.

5. Conclusion

Our findings demonstrate that NPOs are using a number of tools to support their KM-related activities. Non-computer based solutions (i.e., physical and print documents) are popular approaches used to meet KM-related needs in NPOs. However, there is an emerging focus on cloud computing solutions for managing knowledge in NPOs, as well as the importance of public websites in KM-related activities. One surprising finding was the limited use of open source based productivity software, as compared to commercial productivity software (e.g., MS Office); although open source tools may be presumed to be popular choices in NPOs considering that these are low-cost or no-cost options (with limited financial implications) for NPOs, this was not the case for the respondents in this study. This aspect requires further investigation to understand the rationale for low usage of such products as compared to commercial counterparts. It would be interesting to investigate if such usage is due to organizational factors (e.g., financial) or due to human factors (e.g., staff or volunteers).

The findings also suggest that the size of NPOs had an impact on tool use but that the (operating) sector (e.g., animal, community) had no impact on the use of particular set of tools and technologies in NPOs for the managing knowledge. The findings also provide evidence to practitioners that they should select appropriate categories of tools based on the size of an NPO. This work can be extended to study NPOs in other regions of the world (e.g. less economically developed regions) and to use these findings as the baseline for broader global comparisons. Although this study is limited in presenting data from only two countries, the scale and depth of the data present a useful baseline for the addition of data from other countries, in future. The study also provides new additional directions for research, such as how and why size of organization (but not the sector) affects the use of tools and technologies in non-profit sector.

Some of the tools discussed in the finding section are ubiquitous and designed to suit a range of typical office-related activities (e.g., MS Office); others are very specific and designed to support particular needs (e.g., MailChimp). What is clear from the results is the vast number and scope of tools and technologies that are used; however, additional research is needed to fully understand the ways that these tools and technologies are used to support specific KM activities in the non-profit context, and to understand the issues and challenges NPOs face in the use of these tools and technologies. Qualitative research, in particular, can be useful in future to examine the benefits and limitations of these particular technologies from the perspective of those who use them. Studying NPO volunteers, for example, would provide valuable insight on the usefulness of tools and technologies for KM-related practices, as this is a unique population that serves a key role in NPOs but which does not arise in the FPO context. Non-profit organizations play a crucial role in delivering services to community members (Skinner and Joseph, 2007; Lyons and Passey, 2006). Efficient and effective NPOs are important to overall community well-being and KM is one of the approaches that make such organizations more

efficient and effective. However, NPOs' KM successes rely on appropriate and effective use of tools and technologies – many of which are generic in nature and not designed, specifically, to support KM activities. There has been rigorous KM-related research from the perspective of for-profit organizational needs, but the NPO domain lacks the same depth and breadth of research. At present, there is limited understanding of how technology can support KM related activities in NPOs; this is an area for further investigation. Without an understanding of basic KM-related issues, it is even harder to explore advanced topics from the NPOs' perspective. This paper sets a baseline of knowledge for this important sector to inform future work (e.g., reasons for limited adoption of open source based productivity software, impact of size and geographical location of operation of NPO on tools used for KM practices) and (ultimately) the development of new tools to further support appropriate KM practices.

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Appendix – A

Table 5. Chi-Square Test results Intra-Country – Organization Size-wise

Size	Number of Tools / Technologies	χ^2 Critical Value at 5% Level of Significance	Canada		Australia	
			χ^2 *Calculated*	*p-value*	χ^2 *Calculated*	*p-value*
Very Small, Small, Medium and Others*	All Technologies used ***including*** other tools	40.11 (df=27)	98.3056461	4.9E-10	76.5920023	1.2E-06
Very Small, Small, Medium and Others*	All Technologies used e***xcluding*** other tools	36.42 (df=24)	95.0328613	2.1E-10	70.19945	2E-06
Very Small, Small, and Medium	All Technologies used ***including*** other tools	28.87 (df=18)	88.7240674	2.4E-11	56.847301	6.5E-06
Very Small, Small, and Medium	All Technologies used e***xcluding*** other tools	26.3 (df=16)	86.1094769	1.3E-11	51.5489482	1.3E-05
Very Small, and Small	All Technologies used ***including*** other tools	16.92 (df=9)	35.78694	4.3E-05	24.4962434	0.0036
Very Small, and Small	All Technologies used e***xcluding*** other tools	15.51 (df=8)	35.604456	2.1E-05	20.406705	0.008
Medium and Others	All Technologies used ***including*** other tools	16.92 (df =9)	3.0996907	0.960	3.58388615	0.936
Medium and Others	All Technologies used e***xcluding*** other tools	15.51 (df=8)	3.09636202	0.928	3.43066161	0.904

Others* including large, very large and miscellaneous not identified in any of the categories.

Table 6. Chi-Square Test Results Inter-Country - Organization Size-wise

Size	Number of Tools / Technologies	χ^2 Critical Value at 5% Level of Significance	Canada vs Australia	
			χ^2 *Calculated*	*p-value*
Very Small NPOs – Canada and Australia	All Technologies used ***including*** other tools	16.92 (df=9)	6.513	0.688
Small NPOs – Canada and Australia	All Technologies used ***including*** other tools	16.92 (df=9)	8.424	0.492
Medium NPOs – Canada and Australia	All Technologies used ***including*** other tools	16.92 (df=9)	9.275	0.412
Very Small NPOs – Canada and Australia	All Technologies used e***xcluding*** other tools	15.51 (df=8)	5.923	0.656
Small NPOs – Canada and Australia	All Technologies used e***xcluding*** other tools	15.51 (df=8)	4.913	0.767
Medium NPOs – Canada and Australia	All Technologies used e***xcluding*** other tools	15.51 (df=8)	4.069	0.851

Table 7. Chi-Square Test results Canadian NPOs – Organization Sector-wise

Sectors	Number of Tools / Technologies	χ^2 Critical Value at 5% Level of Significance	Canada	
			χ^2 *Calculated*	*p-value*
Animal welfare, Community, Culture, arts, Education and research, Health, International aid, Religion, Social services, Other	All Technology used ***including*** other tools	92.81 (df=72)	**79.8968536**	**0.24493**
Animal welfare, Community, Culture, arts, Education and research, Health, International aid, Religion, Social services, Other	All Technology used e***xcluding*** other tools	83.68 (df=64)	**76.0110076**	**0.14463**

Table 8. Chi-Square Test results Australian NPOs – Organization Sector-wise

Size	Number of Tools / Technologies	χ^2 Critical Value at 5% Level of Significance	Australia	
			χ^2 *Calculated*	*p-value*
Animal welfare, Community, Conservation and environment, Culture, arts, Education and research, Health, International aid, Religion, Social services,	All Technology used ***including*** other tools	103 (df=81)	**95.1428159**	**0.13478**
Animal welfare, Community, Conservation and environment, Culture, arts, Education and research, Health, International aid, Religion, Social services,	All Technology used e***xcluding*** other tools	92.81 (df=72)	**85.3352744**	**0.13479**
Animal+ Other,* Community, Conservation and environment, Culture, arts, Education and research, Health, International aid, Religion, Social services	All Technology used ***including*** other tools	92.81 (df=72)	**87.7691256**	**0.09967**
Animal+ Other,* Community, Conservation and environment, Culture, arts, Education and research, Health, International aid, Religion, Social services	All Technology used e***xcluding*** other tools	83.68 (df=64)	**79.377993**	**0.09319**

* Animal sector data was combined with "Other" due to very low observation in a number of categories.