Data Analytics as a Conduit for Progressing Information Systems Research in Nonprofit Organizations

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ABSTRACT

This position paper reviews the existing information systems (IS) research literature related to the nonprofit context and recommends how to significantly progress this research. The conducted literature review shows that very few studies have focused on nonprofit organizations (NPO). Our analysis indicates that IS researchers have investigated a limited number of issues in NPO contexts including potential research frameworks, strategic use of websites, the role of IS leadership, data management, IS adoption, IS use, and information security policies. Non-IS researchers have examined IS adoption, accountability, and social media usage. Studies that address IS use in the nonprofit context lack theoretical reasoning and empirical evidence; thus they cannot explain why and how effective and efficient use of IS can help NPOs achieve their mission goals. In order to motivate and advance our knowledge of the nonprofit context, we present data analytics as an area in which IS researchers could focus as a future path. We suggest ways that IS researchers can apply their expertise in non-NPO contexts to the NPO context.

Keywords

Nonprofit organizations, information systems research, literature review, data analytics

INTRODUCTION

Information systems (IS) research studies the "effective design, delivery and usage of information systems in organizations" (Keen 1980, p. 12), but to date, it has mostly focused on for-profit organizations. Possibly to our detriment, IS research has mostly ignored nonprofit organizations (NPOs), despite many calls for research in this context over the last 20+ years (Burt & Taylor 2000; Hackler & Saxton 2007; Lee & Bhattacherjee 2011; Umapathy & Huang 2015; Zhang, Gutierrez & Mathieson 2010). Within the last decade, little IS research has directly focused on NPOs or NPO-like contexts. The few studies to purposefully investigate non-profit contexts simply referenced a general framework put forth by (Zhang et al. 2010) as justification that NPOs are an interesting and different research context – without studying the issues of those differences. Despite this seminal work, the NPO context has not caught mainstream IS research attention. This paper explains why NPO research should be more important to IS researchers and how we could make progress in this context.

IS research is well-positioned to suggest theories, research methods and guidance on more effective design, delivery and use of IS in NPOs. An opportunity exists for IS research to lead the discussion of NPOs' IS use and become the reference discipline. The fields of nonprofit management and public administration will not wait; they've already started researching these problems, for better or for worse – with or without IS guidance. NPOs are a critical resource in our society because their services improve communities' quality of life. NPOs can significantly benefit from emerging information technologies (IT). For example, NPOs can use Web, social media, and mobile applications to raise funds, to gather and manage data, and to show evidence of program outcomes. Because the nonprofit context is different from for-profits, both theoretical and empirical research are vital to advancing knowledge on IS strategies, applications, and use in the NPO context. However, limited literature prevents us from drawing from a synthesized knowledge base about the nonprofit sector, which in turn affects our ability to conduct impactful, progressive IS research about NPOs.

In this position paper, we first conduct a literature review to identify the key research themes put forth by IS and nonprofit researchers. Second, we argue that data analytics could be a vital driver to make meaningful progress. We conclude with recommendations for types of research work needed to progress IS research in NPOs.

LITERATURE REVIEW OF IS RESEARCH IN NPO CONTEXTS

In this section, we briefly review research work in IS publication avenues that has helped us understand the nonprofit context. We focused the literature search on peer-reviewed articles that addressed the NPO context, then organized the literature into research themes to identify emergent research areas. Despite their inherent overlap, we separated IS research from non-IS research to highlight the appearance of IS-themed research in non-IS outlets. This development represents a missed opportunity for the IS field to fundamentally assert its core identity.

Conceptual Framework for Conducting IS Research in the Nonprofits Sector

One of the most prominent IS research articles on nonprofit contexts is Zhang, Gutierrez, and Mathieson (2010), which proposed a conceptual framework to identify IS research challenges and opportunities in the nonprofit sector. Zhang et al. developed the conceptual framework to motivate other IS researchers to study NPOs. They derived a framework for IS effectiveness in NPOs based on cognitive fit. The conceptual framework entails three tiers: social environment, organizational environment, and IS effectiveness. The inner most tier, IS effectiveness, forms the core of the framework by interconnecting three key elements: worker skills, task performance, and technology use. The second tier, organizational environment, consists of elements related to running an organization such as culture, goals, budgets, strategies, membership, and leadership. The outermost tier, social environment, consists of elements that an organization relies on to function such as service recipients, funders, regulators, government agencies, nonprofit technology providers, and other NPOs. While the framework provides a good window into IS effectiveness for NPOs, empirical research is needed to better understand the tier sub-concepts and to effectively impact IS usage by NPOs. Without additional research, this framework has little practical significance, although it provides a good theoretical base to begin. We found very little research testing this framework.

Strategic Use of Web Technologies

Lee and Bhattacherjee (2011) pointed out basic differences between private, public, and nonprofit sectors and further argued that the lack of organizational and technological capacities is quickly creating a digital divide between NPOs and organizations from other sectors. They developed a theoretical framework to explain factors that may affect strategic use of the Web by NPOs. The framework consists of factors that influence diffusion of innovations such as characteristics of leaders, an organization's size, and its geographic location. Lee and Blouin (2014) further extended this research using survey methodology to identify factors that influence NPOs to disclose financial and performance information on their websites. Results from 176 NPOs showed that NPOs disclose information on their public websites when (1) they have favorable attitudes towards disclosure, (2) web disclosure is considered to be compatible with their organizational beliefs and practices, and (3) they have financial resources to adopt and implement websites. Despite websites and other relevant Web technologies being an essential technology for nearly any organization, most NPOs had not adopted them at all or had done so ineffectively. Lee and Blouin (2014) showed that IS researchers can play a vital role in helping NPOs strategically adopt Web technologies and to help them effectively communicate their organizational activities and goals to stakeholders.

IT Leadership

Richardson, Parrish, and Rosenthal (2011) investigated collaborative IS development in the NPO context. Using Habermas' Theory of Communicative Action, they developed a conceptual framework for NPOs to identify leadership activities which lead to effective collaborative IS development. This framework consisted of the following activities: embracing new members, empowering all members by creating infrastructure for communication and collaboration, involving each member in the collaborative process, mobilizing everyone's efforts for the common good, and resolving conflicts using rational discourse. To our knowledge, we have not seen any other IS literature focused on IT leadership in the NPO context. Empirically investigating appropriate ways to recruit and retain computing personnel in the nonprofit sector remains wide-open.

Data Management

West and Green (2008) investigated data management and data quality principles in the NPO context. They conducted an in-depth case study on two NPOs. The study showed that NPOs typically manage client, volunteer, and donor related information and program outcome assessments, volunteer activities, and donor related communications. The study also revealed that NPOs rely on volunteers to handle data management tasks. They recommended that IS educators should partner with NPOs and assist them with data management tasks as a service learning activity. This study suggests that NPOs are ripe for design science or action research methods in which the researchers are more than passive observers.

IT Adoption

O'Hanlon and Chang (2007) developed a research model for NPOs' Internet technology adoption based on other adoption literature. The research model consisted of four main constructs: perceived external pressure, organizational readiness, compatibility, and internal support. They surveyed 119 NPOs in the Western Australian state to validate the model for the NPO context. Their findings showed that Internet technology use was influenced by pressure from donors, the organization's budget and technical capacity, the ratio of paid employees to volunteers, organizational practices, and the level of internal support. Zorn, Flanagin, and Shoham (2011) conducted a survey to study institutional and non-institutional influences of information and communication technology (ICT) adoption among NPOs. They investigated influences of environmental factors, organizational characteristics, and institutional isomorphic pressures on NPOs' technology adoption decisions and usage behaviors. Findings from 2,543 NPOs in New Zealand showed that institutional isomorphic pressures and organizational characteristics predicted NPOs' adoption and use of ICT to support website adoption, communication and information flow,

stakeholder engagement, and resource acquisition. In a similar study, Ward and Never (2012) surveyed 72 NPO managers about differences between geographic information systems (GIS) and website adoption among NPOs. Despite believing GIS could improve their performance, the managers were less likely to adopt GIS due to high risk, maintenance, lack of technical knowhow, and little peer pressure. Their findings also revealed that variables for GIS adoption did not give similar results as variables for website adoption. Specifically, they measured organizational variables including resource availability, top management support, technical expertise, willingness to take risk, and number of paid IS employees, system variables such as ease of maintenance and performance improvement, and environment variables such as peer pressure and predictable demand.

Most recently, Umapathy and Huang (2015) surveyed 53 NPOs in a county in the U.S. to study NPOs' IT adoption perspectives. Their survey found that most NPOs spent less than 5% of their operating budgets on IT-related expenses and largely relied on external support for IT tasks. Furthermore, NPOs were more likely to use stable and proven IT, to not have a strategic plan for technology, and to leave IT decisions to executive directors. Their findings also revealed that most NPOs performed tasks for social network sites (SNS), websites, and data management in-house whereas infrastructure management was outsourced. This research showed that a wide variety of factors can potentially influence IT adoption, but they have not provided a reliable explanation for the digital divide seen in the NPO sector nor which factors predict or improve IT adoption rates in NPOs.

IS Use in NPOs

In a three part study, Connolly (2014) dissertation focused on how NPOs can effectively use SNS to recruit and retain volunteers. The first study revealed that NPOs do not use SNS effectively because organizational practices conflict with control and usage of SNS, while the second study used verbal protocol analysis to show that NPOs may be able to motivate people to volunteer by better relating content and features to people's interests. To better motivate people to volunteer, NPOs need better strategies for what to post, when to post it, and how to present material in an appropriate medium. The third study provided a benchmark for NPOs to assess SNS initiatives as active use (creating new content by posting updates and photos), passive use (liking other people's posts), or co-op (piggybacking on other people's posts by sharing and posting comments).

Oakley (2014) dissertation examined the value of information systems in NPOs, also in a three part study. The first study used an action research lens to develop dashboards for two NPOs. The results showed that NPOs need assistance with how to espouse IT friendly work practices and that power struggles between employees and volunteers can severely impact implementation and adoption of IT in NPOs. The second study addressed the use of business intelligence in an NPO based on knowledge-based view (KBV) of the firm. Findings from this study showed that KBV is more applicable than resource-based view for building intellectual capital and repurposing existing knowledge to create new knowledge. The third study presented a set of guidelines for NPOs to use business intelligence based on comparative and SWOT analyses. While this research showed that IS researchers can make significant impact in NPOs, more in-depth studies like these will increase the impact of IS research and our understanding of how information systems are used in the NPO context.

Information Security Policies

Imboden et al. (2013) surveyed NPOs from two counties in the U.S. to investigate their information security policies, because NPOs store, process, and transmit sensitive data. The public's trust played a central role in determining the NPOs' continued existence. Thus, NPOs ought to have reliable organizational information security policies to protect their data. Despite the importance of securing data, of the medium- to large-sized NPOs surveyed, only half reported having an information security policy, while two-thirds reported at least one known security incident. The majority of these NPOs (90%) recognized that the organization's IT poses a risk. Their study also revealed that NPOs with larger budgets were more likely to have an information security policy in place. However, the majority of NPOs operating in today's economy are small to medium-sized and thus, do not have large budgets to spend on IT.

LITERATURE REVIEW OF IS RESEARCH ON NPO BY NON-IS DOMAINS

To discover published studies relevant to IS and nonprofits, we include additional research from domain reference fields such as nonprofit management and public administration. In this section, we review literature from non-IS publications which are related to IS use in the NPO context. We create this dichotomy to stress the obvious lack of IS research in the NPO context.

IT Adoption

Burt and Taylor (2000) investigated levels of uptake and applications of IT by NPOs in the U.K. using surveys and case studies. A survey of 430 NPOs revealed that most nonprofits were slow and cautious in adopting IT. Higher levels of IT uptake were seen when NPOs employed IT staff rather than relying on volunteers. They also conducted a more in-depth case study of two NPOs with higher uptake of IT. These NPOs used IT to reshape internal communications with staff and reconfigure external communications with stakeholders and clients. They made data available to staff in a centralized system in such a way that data could be consolidated and analyzed for trends in order to make effective data-driven decisions on usage of resources. Hackler

and Saxton (2007) examined strategic use of IT within the nonprofit sector by surveying more than 1,500 NPOs. Their survey findings showed that most NPOs were using IT for financial sustainability via fundraising software, online donations, grant opportunities, and applying for funds; they used emails and websites to communicate to service clients, volunteers, staff, and other stakeholders. However, most NPOs did not align their technology decisions with the organization's mission, did not have long term IT plans, skilled IT staffs, adequate IT budget, a long-term vision for technology use, or involvement of senior management with technology decisions. These research findings are consistent with IT adoption literature.

Virtual Accountability

Dumont (2013) developed a Nonprofit Virtual Accountability Index (NPVAI) to benchmark NPOs' ability to be held accountable to stakeholders. Dumont analyzed NPOs' websites to identify components used to achieve virtual accountability. Exploratory factor analysis on the collected data revealed that: accessibility of virtual accountability was associated with consistent navigation components, engagement factor was associated with newsletter and community update components, performance factor was associated with annual report and financial information components, governance factor was associated with bylaws information components, and mission factor was associated with strategic goals and plans components. These findings are consistent with IS literature on strategic use of Web technologies.

Social Media Usage

Lovejoy and Saxton (2012) examined diffusion of Twitter in the 100 largest NPOs in the U.S. This study sampled about 2,400 tweets over a two-week period and analyzed their contents using an open coding system. The analysis showed that NPOs predominantly used Twitter to share information related to their mission, to recognize and thank donors and other supporters, and to promote events. These NPOs used Twitter as an extension to their website to share and communicate relevant information as opposed to community-building and mobilization. Svensson Mahoney, and Hambrick (2014) used the Lovejoy and Saxton (2012) framework to investigate Twitter use among NPOs involved in sports as a tool for social change. Their analysis of more than 3,200 tweets showed that a larger proportion were one-way communication to provide information and NPOs rarely used Twitter to explicitly request stakeholder action or support their causes.

Water et al. (2009) conducted content analysis based on the Facebook profiles of 275 NPOs. Most NPOs did not go beyond creating a profile. Active Facebook users disclosed and disseminated information. Water et al. suggested that careful planning could help NPOs use Facebook more strategically and to develop relationships with stakeholders. Campbell, Lambright, and Wells (2014) investigated usage of SNS (with emphasis on Facebook) by NPOs, funding agencies, and government departments in one U.S county. They analyzed social media content from 25 county departments, 17 funders, and 151 NPOs and conducted semi-structured interviews with 10 county departments, 10 funders, and 20 NPOs. Their study findings revealed that very few NPOs and public organizations had adopted SNS, and of those who had, none had high levels of activity. SNS was predominantly used for marketing purposes and most organizations did not have a long-term vision for using SNS.

Clark, Maxwell, and Anestaki (2016) studied Facebook engagement among symphony NPOs and their public stakeholders. Based on stewardship theory, they investigated how NPOs nurtured and sustained relationships with stakeholders via social media by analyzing the Facebook sites of 159 NPOs. They relied on a social media analytics platform called Simply Measured to download two weeks of Facebook stakeholder engagement scores. Facebook engagement scores aggregate Likes, shares, and comments per post. An ordinary least squares (OLS) regression analysis showed a positive relationship between private contributions and Facebook engagement. Stakeholder engagement predicted private contributions such that for a 4.9% increase in Facebook engagement, an NPO can expect 10% more in contributions. In a related study, Mano (2014) analyzed responses for civic activities and community involvement from 2008 Pew Research data. Through a correlation analysis and OLS regression analysis, they showed that SNS and ideology positively affected both online and offline contributions.

DISCUSSION ON LITERATURE THEMES

Our analysis indicates that the common themes among IS and nonprofit domain research are IT adoption, strategic use of web technologies for disclosure, and SNS usage by NPOs. These research studies showed that an organization digital divide exists between the nonprofit sector and other sectors as well as within the nonprofit sector itself. Both IS and non-IS researchers argue that information technology is not well adopted and if adopted it is being used inadequately by NPOs. Researchers indicated several factors for IT adoption and use, but none found factors to predictably improve adoption rate. In general, IS studies conducted on NPOs did not focus on nonprofits as a context, but rather as a willing convenience sample. Much extant research of IS within NPOs focuses on use; none addressed IS design and delivery. Although many studies claimed that effective IS use will help NPOs achieve their mission goals effectively and efficiently, existing findings tautologically linked IS use with NPOs. In a nutshell, there is not enough academic literature to comprehensively understand the value or effectiveness of information systems in NPOs. We found a limited number of academic studies of IS in the NPO context. We have not even defined what "effective IS use" in the NPO context means. Without meaningful progress, this research area will continue to languish.

DATA ANALYTICS: A DRIVER FOR IS RESEARCH

Because of its popularity and importance to the IS field, we believe data analytics could be an appropriate driver to increase IS research interests within the nonprofit sector. NPOs collect data about their clients, volunteers, donors, services, and program outcomes. Analyzing this data and reporting program effectiveness are important tasks for NPOs because they increase their ability to gain funding. IS researchers could assist nonprofits in identifying more efficient ways to gather data outside and within the organization, better understanding why and how data should be managed, identifying theories and perspectives to analyze data, and making effective programmatic and policy decisions based on analytical interpretations. As a first step to contributing towards this research stream, below we have highlighted a few research opportunities to help build an IS knowledge base on NPOs.

Comparative Analysis of the Organizational Divide in NPOs

The organizational digital divide between nonprofits and other types of organizations is an anecdotally accepted fact, but extensive documentation of this organizational divide does not exist. The digital divide problem exists within the sector itself as well; whereas larger organizations have sufficient funds for IT, medium to smaller NPOs struggle to survive. Comparative analysis studies are needed to systematically determine similarities and differences across nonprofit sectors as well as against for-profit and government sectors. For example, for-profits focus on outcomes like Return-On-Investment and predominantly analyze collected data to make effective decisions but NPO outcomes are mission-driven and often do not make data-driven decisions. Such studies can help build theories on how the digital divide occurs and test hypotheses to overcome the divide. Analytics may be useful to collect and analyze readily-available, industry-wide data.

Cultivate Data Scientists, IT Staff, and Training Modules Catered Towards NPOs

Nonprofits face considerable resource constraints to make the best use of data, available IT resources, and professional expertise to accomplish their program objectives. Hackler and Saxton (2007) and Umapathy and Huang (2015) indicated that NPOs spend less than 5% of their budget on IT infrastructure, most staff are not trained for IT tasks, they heavily rely on volunteers for IT tasks, and they do not offer professional development support to gain new IT skills. Research further showed that most NPOs do not have any form of technology planning. Thus, it is difficult for NPOs to attract and retain staff skilled in IT and data analytics, which in turn makes it difficult to diffuse data-driven decision philosophies and technological solutions in general. IS researchers are well positioned to tackle this problem. For example, the central focus of ACM SIGMIS is research on computers and people. We believe IS researchers can perform impactful work that addresses both nonprofits and the IS community, but unless researchers focus their attention on NPOs, tremendous opportunities will be lost.

Business Analytics for NPOs

Decisions made by nonprofits have organization- as well as community-wide impact. Efficient and effective delivery of services can have long-standing impacts on communities and improve everyone's quality of life. However, not much is known about data-driven or evidence-based decision making in the nonprofit sector. Similar to for-profit organizations, business analytics can play a vital role in NPOs' ability to provide better services to recipients. A large-scale survey is needed to benchmark the status of data-driven decision making in the nonprofit sector. Such a large survey should also focus on gathering data on data sets used, performance metrics, analytical skillsets, and toolsets used within the sector. In order to promote data-driven decision making and use of business analytics toolsets, in-depth case studies and participatory action research may be required. Quantitative and qualitative data on the use of business analytics by NPOs needs to be collected with the aim of building a knowledge base (theory and best practices) that could produce a wide variety of testable hypotheses and support the development of business analytics toolsets to overcome challenges of human, financial, and technology resource constraints.

Development and Delivery of Data Analytics Toolsets

The design, development, and delivery of effective and efficient information systems for the NPO context remains a wide open phenomenon. Design science researchers could identify ways to develop solutions for NPOs that do not require extensive software development and training time. IS researchers and educators could work closely with nonprofits as a part of service learning activities to develop custom solutions for NPOs. Design science researchers could develop a knowledge base on best practices for designing and developing software systems that can be easily diffused in the nonprofit sector. Cloud infrastructure and software as a service delivery mechanisms have not gained much ground in the nonprofit sector. More research is needed to identify roadblocks and appropriate ways to deliver software tools in the NPO context. IS research is well positioned to lead these discussions.

CONCLUSION

This position paper calls for information systems research on nonprofit organizations. Current IS literature on NPOs is not adequate for building a reliable knowledge base for the nonprofit sector. Researching nonprofits is an interesting phenomenon

in and of itself, and impactful research is likely to produce exponential practical contributions that benefit society. For IS researchers interested in securing grant funding, NPO contexts could provide a viable environment for many interesting research projects with broad impacts. We propose that perhaps recent interest in data analytics could drive more IS attention to NPO research, which would diversify research contributions made by the IS community.

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