THE FINANCIAL BENEFITS OF INFORMATION TECHNOLOGY ADOPTION IN NONPROFIT ORGANIZATIONS

by

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ABSTRACT OF THE DISSERTATION

The Financial Benefits of Information Technology Adoption in Nonprofit Organizations

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Information technology (IT) brings opportunities for nonprofit organizations. However, lack of funding sources is one of the main barriers to IT adoption in nonprofits, especially when nonprofits are operating with limited resources and pressures from funders to focus resources on beneficiaries. The financial returns of IT investment and whether IT adoption in nonprofit organizations is worth the money remains uncertain in the existing literature. Thus, this three-essay dissertation investigates the financial benefits of IT adoption in nonprofits.

The first study uses 990-panel data of over 9,000 nonprofits from 2010 to 2017 to examine how IT expenses generate financial returns for nonprofit organizations. The results show that IT investment allows nonprofits to increase their financial capacity. IT expenditures positively impact total revenue, charitable donations, and program service income. Moreover, it improves management efficiency, but not fundraising efficiency or program service efficiency.

The second study looks at social media as a low-cost and easy-to-adopt IT. To test the impact of social media engagement on fundraising campaign outcomes, this study samples 100 small nonprofits that disclosed their 2020 Giving Tuesday campaign

performance on Twitter and analyzed their account activities using a computational social science method. The impact of account activeness and engagement on fundraising campaign outcomes is investigated in multiple periods - within the #GivingTuesday hashtag, one week, one month, one year, and since account establishment. Results find mixed effects of social media engagement on fundraising performance.

The third study visits the problem from donors' perspective. By conducting an online survey experiment among 1,040 participants, this study investigates the donors' reaction to nonprofits' IT budget, purposes, and performance. Results show that IT adoption performance has a positive impact on donations. Surprisingly, donors are more likely to donate to organizations with higher IT budgets. However, the detailed information disclosed about the purposes of IT projects negatively influences their willingness to donate.

This dissertation contributes to the nonprofit management literature on IT, overhead costs, communication effectiveness, signaling and reputation building, public engagement, and individual giving. It also provides practical suggestions for nonprofit managers to adopt IT strategically and effectively.

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Chapter 1

Introduction

Information technology (IT) has been one of the most popular contemporary topics. It is defined as the use of computer systems, including hardware, software, and networks, to create, process, and exchange information. The rapid renovation of information technology reshapes various fields like medicine, entertainment, business, education, marketing, law enforcement, and more. People's everyday life has also been changing with the development of information technology.

The field of nonprofit management also witnesses the growth of emerging information technology. Nonprofit organizations have been incorporating various types of technology in practice. For instance, the webpage has been a common platform for nonprofits to share information and introduce themselves to the public (Beckley, Elliott, & Prickett, 1996; Bennett, Fielding & Rockefeller, 1999). Many nonprofits use mobile text subscriptions to communicate with their donors, volunteers, and other external stakeholders (Cole-Lewis & Kershaw, 2010; McCarthy, 2012). Similar to their business counterparts on the market, nonprofit organizations adopt online video platforms (Waters & Jones, 2011) and other new technology to connect with their potential clients for marketing purposes. Social media plays an important role in maximizing the impact of nonprofit advocacy organizations (Guo & Saxton, 2014; Guo & Saxton, 2018; Obar, Zube, & Lampe, 2012). Information technology is also used for internal management, such as database management (Lampkin & Boris, 2002), cloud computing systems

(Azevedo, 2021), and more. However, compared with their counterparts in the private sector, the nonprofit sector generally lags in utilizing new technologies.

Nonprofit organizations face many challenges. For example, sustainability, engaging donors, recruiting volunteers, and organizing their internal management and external relations. The fundamental problem of all these challenges is the lack of resources. Compared to their counterparts in the private sector, nonprofits are under an extreme burden to function well with limited resources. Nonprofit organizations are expected to make the maximum impact with the minimum cost. Nonprofits are not expected to own a well-established infrastructure with fancy equipment, because the sector heavily relies on charitable donations and voluntary labor.

Technology is expensive. Establishing an IT project requires not only purchasing the hardware and/or software, but also supporting resources. Maintaining an adopted technology cost consistent subscription fees, as well as well-trained human resources. The rapid development of information technology makes upgrading and transitioning more frequent. Thus, consistent input in adopting information technology is not affordable for many nonprofit organizations, especially when they are under pressure to minimize their cost in administration.

As a result, one of the main obstacles for nonprofit organizations to adopting information technology is the lack of funding sources. Although in practice, many managers would not question the benefits of adopting better information technology, they still need to convince donors and funders to support the input in information technology. Nonprofit leaders tell stories about the information technology cost being paid off because the investment generates returns and is worth the money. Information technology

can be adopted for different purposes. For example, for fundraising purposes, adopting a new online fundraising platform may require additional costs, but the donations received from the new platform will cover the cost. For program service purposes, purchasing a client database management system can better record the details of service delivery and client feedback, thus generating better service fees. For management and administrative purposes, computer-assisted communication is more efficient in processing internal administrative issues, as well as improving the organization's external engagement with donors, volunteers, and other stakeholders, as a result, saves administrative costs and generates higher revenues.

Though the anecdotal stories may help the organization receive support in IT spendings case by case, the nonprofit sector generally still suffers from seeking resources to cover the expensive information technology. Whether information technology is worth the money is always questioned and challenged. If the nonprofit managers could convince the stakeholders that information technology can generate financial benefits to cover the expenditures, it may bring more resources to be allocated to establishing, maintaining, and updating the needed information technology projects.

So, the motivation of the dissertation lies in the challenges the nonprofit sector is facing. In this three-essay dissertation, the author conducts three separate studies around the topic of information technology adoption in nonprofit organizations. All the studies focus on the financial benefits of adopting information technology. Chapters 2, 3, and 4 present the three studies as three separate essays.

The first study (Chapter 2) examines how information technology expenses generate financial returns for nonprofit organizations across the whole sector. Over 9,000

501(c)3 nonprofit organizations are included in the sample. Secondary data is collected from their 990 tax form from 2010 to 2017. Using panel data analysis, the study explores the correlation between information technology expenditure and organizational financial capacity. Results show that expenditures in information technology positively impact the total revenue, charitable donations, and program service income. Moreover, input in information technology improves management efficiency, but not fundraising efficiency or program service efficiency.

The first study includes only nonprofits who reported information technology spending in their tax form. However, many small nonprofits actively adopt low-cost technology, though not detailly reported when filing taxes. The second study (Chapter 3) focuses on social media as a low-cost information technology and small nonprofit organizations that may not be included in the sample of the first study. The second study asks, how does social media engagement impact fundraising campaign performance for small nonprofit organizations? One hundred small nonprofits that disclosed their 2020 Giving Tuesday campaign performance on Twitter are included in the sample. Data is scrapped from their Twitter account activities using a computational social science method. The impact of account activeness and engagement on fundraising campaign outcomes is investigated in multiple periods, including during the campaign under the #GivingTuesday hashtag, one week before the campaign, one month before the campaign, one year before the campaign, and since the establishment of the Twitter account. Results find mixed effects of social media engagement on fundraising performance.

The first two studies investigate the financial impact of information technology in nonprofits from the organization's perspective. The third study (Chapter 4) examines the problem from the donor's perspective. Donation is an essential part of nonprofit financial capacity. However, the expenditures on technology infrastructure as part of the overhead cost may scare away donations. So, the research question of the third study is, do donors care about the information technology adoption and expenses in nonprofit organizations? This study conducts an online survey experiment to investigate the donors' reactions to nonprofits' information technology budget, purposes, and performance. One thousand and forty respondents participated in the study on Qualtrics. Results show that donors like to see nonprofit organizations perform well in adopting information technology. Surprisingly, donors are more likely to donate to organizations with higher budgets for information technology. However, the detailed information disclosed about the purposes of IT projects negatively impacts their willingness to donate.

All three essays make theoretical contributions to the nonprofit literature. Management implications are discussed in the middle three chapters. While the three chapters naturally talk to each other in research design, the final chapter presents the conversation among the chapters, and synthesizes both the theoretical and practical contributions of the dissertation. This dissertation finds evidence of the financial benefits of information technology adoption in nonprofit organizations. It also suggests a more open and innovative approach for nonprofits to acquire resources in information technology.

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Chapter 2

The Return on Information Technology Investment in Nonprofit Organizations

2.1 Abstract

Lack of funding sources is one of the main barriers to information technology (IT) adoption in nonprofits. The return on investment in IT is also uncertain, especially when nonprofits are operating with limited resources and pressures from funders to focus resources on beneficiaries. This paper examines how IT expenses generate financial returns for nonprofit organizations. Using 990 panel data of over 9,000 nonprofits from 2010 to 2017, the results show that IT investment allows nonprofits to increase their financial capacity. Expenditures in information technology positively impact the total revenue, charitable donations, and program service income. Moreover, it improves the management efficiency, but not fundraising efficiency or program service efficiency. While focusing on IT, the study also recasts the debate on overhead expenses, showing them to be not obstacles to operational efficiency, but rather critical drivers of financial growth. For practitioners, the results open the door to take a new look at the role of IT in driving organizational success.

2.2 Introduction

Much of the earlier research on technological innovations are focused on business organizations. In recent years, with the nonprofit sector catching up with the private sector on this innovation, more studies have been done on information technology usage in nonprofit organizations. Among these, the impact of information technology is one of

the most popular research topics over the past decades. The positive effects of technology innovations in the business field are associated with timely and accurate communication, efficient operation, increased productivity, reduced cost, and amplified market (Dehning & Richardson, 2002; Mahmood & Szewczak, 1999). For nonprofit organizations, the growth of technology will benefit them in meeting their missions, serving their clients, raising and managing funds, managing their human resources, controlling their political issues, keeping positive public images, and maintaining relationships with stakeholders. Unlike business literature, nonprofit studies reported few details previously regarding the financial benefits of information technology innovation.

IT is expensive to establish, maintain, and improve. The rapid change and improvement make it even more unaffordable for nonprofits (McNutt, Guo, Goldkind & An, 2018). Lack of funding resources is the main barrier for nonprofit organizations to adopt information technology (Gellar, Abramson & de Leon, 2010; Senne & Barbosa, 2015). It is not easy to convince the donors or funders to support information technology expenses because the output is often not measurable. The nonprofit field is under significant pressure to perform efficiently with limited resources and function well. Many managers question, is allocating resources to information technology a worthy decision?

So, the research question of this study is what are the financial returns on IT investment in nonprofit organizations? Specifically, how does IT expense bring revenues to nonprofit organizations? How does IT expense improve efficiency in nonprofit organizations?

2.3 Literature Review

2.3.1 Impact of Information Technology in Nonprofit Organizations

The nonprofit sector witnesses the development of information technology over time. In the 1990s, Web 1.0 ("the Static Web") made it possible to search for information and read it online. In the early 2000s, Web 2.0 ("Social Media") allowed user interactivity and user-created content. Web 3.0 ("the Semantic Web") brings in data as a key component (McNutt, Guo, Goldkind & An, 2018). The development of information technology from "read-only" to "read-write," then "read-write-executive" (Singh & Gulati, 2011) evolved the management of nonprofit organizations and opened more outreach opportunities to them. The development of new technologies has a profound impact on the lifestyles of the stakeholders and consequently on the concepts and the practices of marketing (Erragcha & Romdhane, 2014). While information technology is attractive to many nonprofits, its impact is still unsettled in literature. Understanding the changes in the nonprofit sector with the development of technology and how nonprofits can exploit emerging information technology is essential.

In E-government literature, the impact of information technology is grouped into three categories, government to citizens (G2C), government to business (G2B), and government to government (G2G) (Evans & Yen, 2006; Heeks & Bailur, 2007; Yildiz, 2007). G2C focuses on the ability of the government and citizens to communicate information to each other efficiently and electronically. G2B focuses on the monetary capacity to reduce costs and gather better information. G2G focuses on delivery efficiency when transacting information within itself or with other governments.

This three-category model can be adopted in nonprofit technology impact. Literature has identified the different aspects and channels where nonprofit organizations adopt information technology (Hackler & Saxton, 2007; Jaskyte, 2012; McNutt, Guo, Goldkind & An, 2018). There are also three categories of opportunities that information technology can bring to nonprofit organizations. First, nonprofits to clients. If citizens are seen as government clients in the G2C model, this category of opportunities in nonprofits is to deliver service and communicate information to clients in an efficient manner with the adoption of technology (Geller, Abramson & de Leon, 2010; Goldkind, 2015). Second, nonprofits to donors. In government, the G2B model focuses on the monetary value of technology in communicating with businesses as taxpayers. In nonprofit organizations, particularly, the donors are the ones who bring revenue. So, with the adoption of information technology, electronic information delivery will attract more donors and improve fundraising by eliminating exclusions and enlarging the platform (Belleflamme, Lambert & Schweinbacher, 2010; Lee & Joseph, 2013; Leland, 2008). Third, nonprofits to nonprofits. The G2G model in E-governance is the communication from organization to organization. For nonprofits, this category of opportunities strives to improve the delivery efficiency within the organization and with other nonprofits. In one way, within the organization, technology helps to reduce managerial costs by improving efficiency in administration and internal operation (Dumont, 2013; Gahran & Perlstein, 2012; Munizu, 2010). On the other hand, information technology brings external communication and collaboration opportunities among the social networking in the nonprofit sector (Bogner, Tharp, & McManus, 2013; McNutt, 2008; McNutt & Goldkind, 2018).

2.3.2 Return of Information Technology Investment in Private Sector

While few pieces of nonprofit literature have discussed the financial benefits of information technology investment, in the information system literature, there is a robust body of literature about the returns on investment (ROI) in information technology. Most of the studies focus on the private sector.

As early as the 1990s, researchers have started to relate IT investment measures to organizational strategic and economic performance measures. Information technology investment payoffs are widely discussed in the private sector. However, the results are inconsistent (Khallaf, Omran & Zakaria, 2017).

In early literature, information system researchers find the "Productivity Paradox," which refers to the absence of a positive correlation between spending on IT and productivity or profitability at both the industry level (Solow, 1992) and the firm level (Brynjolfsson, 1993; Landauer, 1995; Strassmann, 1990,1997; Weill, 1992).

However, later studies find positive payoffs from information technology investment (Mahmood & Mann, 1993; Brynjolfsson & Hitt, 1995; Dewan & Min, 1997; Hitt & Brynjolfsson, 1996; Lichtenberg, 1995; Stratopoulos & Dehning, 2000). The reasons for the productivity paradox are suggested, including measurement problems, time lags between IT investments and their impacts, redistribution of outputs within an industry, and mismanagement of IT assets (Brynjolfsson, 1996). Thus, the question changed from "is there a payoff" to "when and why is there a payoff" (Dehning & Richardson, 2002).

Mahmood and Szewczak (1999) investigate the decision-making process of business investment in information technology. They find that if the benefits are competitive with other investment alternatives (such as a major marketing campaign), then the business will commit financial resources to the IT proposal. Otherwise, it won't. So they argue that business investment in information technology (IT) is at root no different from business investment in anything else.

Kohli and Devaraj (2003) conducted a meta-analysis of structural variables in firm-level empirical research and measured the information technology payoff. Their results indicate that the sample size, data source (firm-level or secondary), and industry in which the study is conducted influence the likelihood of the study finding more significant improvements on firm performance. The choice of the dependent variable(s) also appears to influence the outcome (although we did not find support for process-oriented measurement), the type of statistical analysis conducted, and whether the study adopted a cross-sectional or longitudinal design. Khallaf, Omran and Zakaria (2017) explain the inconsistent results of the impact of information technology investments on firm performance with a longitudinal analysis of the literature review. The context of research questions raised, data used, level of analysis, IT investment measures, firm performance measures, time horizon, and industry characteristics may influence the returns on IT investment payoff research.

Compared to the robust literature on IT investment returns in the private sector, there is a lack of study in IT investment payoffs in the nonprofit sector. Even within the private sector, a remaining puzzle is that many factors influence the payoff research outcome, let alone directly implement findings to the nonprofit sector. Nonprofit

organizations emphasize public goods and values. Their mission is different from the private sector, which focuses on profit. They have different decision-making processes. Meanwhile, nonprofit organizations are under a significant burden to perform with limited resources. Thus, exploring a model to measure the ROI of information technology in nonprofit organizations is much needed.

2.3.3 The Administrative and Fundraising Costs and Donations in Nonprofit Organizations

Though few studies have looked into the information technology investment, in IRS annual tax filing Form 990, information technology expenses (Part IX, line 14), as part of the functional expenditure, include three sub-categories - program service expenses, management and general expenses, and fundraising expenses. Information technology can be seen as a part of the infrastructure of nonprofit organizations. Existing literature about the administrative and fundraising costs in nonprofit organizations offers directions to evaluate the financial impact of information technology. Researchers have found that functional and administrative expenses, as well as fundraising costs, have mixed effects on revenues and efficiency (Trussel & Parsons, 2007; Calabrese, 2020).

On one side, major research consistently supports that nonprofit organizations that report higher overhead rates receive fewer donations (Callen, 1994; Gordon, Knock & Nealy, 2009; Jacobs & Marudas, 2009; Khanna, Posnett & Sandler, 1995; Marudas, 2004; Tinkelman, 1998; Tinkelman & Mankaney, 2007; Yan & Sloan, 2016). Because of the public belief that low overhead is better than high overhead, nonprofit organizations have minimized their cost in general management in order to attract funders and donors.

Grizzle (2015) finds arts and cultural nonprofits' spending on fundraising and marketing have a positive effect on funds raised to some extent. Meanwhile, she also emphasizes that the efficiency of fundraising matters. Krishnan, Yetman & Yetman (2006) find evidence that nonprofits underreport fundraising expenses because of managerial incentives to report lower expenditures.

On the other side, the nonprofit starvation cycle literature points out that nonprofit organizations over-reduced the operational cost to the extent that even mission-related activities are negatively affected (Lecy & Searing, 2015). Gneezy, Keenan and Gneezy (2014) find that nonprofit organizations face limitations on how they can recoup administrative and fundraising costs. For administrative costs, some researchers find evidence that lower overhead cost reduces effectiveness, which undermines the mission of the nonprofit agencies (Wing & Hager, 2004; Gregory & Howard, 2009). The overall financial positions would be weakened by low overhead costs as well (Greenlee & Trussel, 2000; Tevel, Katz & Brock, 2015; Trussel, 2002). For fundraising costs, Young and Steinberg (1995) find that minimizing fundraising costs are not sufficient for nonprofit agencies to raise donations until marginal costs meet marginal revenues. Also, fundraising inefficiency leads to increased regulatory and compliance costs (Steinberg & Morris, 2010).

The minimized overhead cost and insufficient fundraising costs reduce effectiveness and efficiency in daily operation, service delivery, and fundraising. Information technology could be a potential tool to boost administrative and fundraising efficiency. However, little research has been looking specifically at the effects of

information technology expenses. Thus, research on the financial returns of information technology expenditure is much needed.

2.4 Theoretical Foundation and Hypotheses

The resource-based view (RBV) argues that organizations possess resources, which will enable them to achieve competitive advantages and improve performance (Barney, 1991). Although the idea of RBV came from the context of for-profit organizations, it is applicable to the nonprofit context as well (Akingbola, 2013). From the RBV perspective (Barney, 2001), a nonprofit organization is organized with diverse resources and capabilities that are required to function and win a competitive advantage. Resource acquiring and allocation is the key to successful performance in nonprofit organizations.

In particular, the nonprofit field is under significant pressure to perform well with limited resources. In this study, IT is not only considered as one type of external resource that nonprofit organizations can procure. It also boosts advantages for nonprofit organizations by obtaining rich resources from the collective information and knowledge globally (Kearns & Lederer, 2003). As shown in Figure 2.1, additional resources may bring a competitive advantage to the organization and positively affect organizational performance, and therefore generate higher returns on IT investment.

Figure 2.1. Resource-based View Theory

There are various ways to measure information technology and its return in extant business literature. In Mahmood and Mann's (1993) study, information technology investment is measured by IT budget as a percentage of revenue, the percentage of IT budget spent on training of employees, number of PCs per employee, and IT value as a percentage of revenue. Strategic and economic performance measures include sales by employee, return on sales, sales by total assets, return on investment, and market to book value. Dehning and Richardson (2002) synthesize the measurement of information technology investment and its returns. The three ways of how information technology has been measured include IT spending, the type of IT, and IT management/capability, The returns on investment include market measures (e.g., stock returns, market capitalization) and accounting measures (e.g., return on assets, return on equity, return on sales, coordination costs, administrative productivity, labor productivity). In the public sector, Cresswell (2004) identifies the lack of models that can guide public managers to analyze the costs and returns from the proposed information technology investment. He also argues that ROI in the public context refers to political and policy influences. As discussed in the literature review section of this paper, though the nonprofit literature has examined the positive impacts of IT, few have discussed the direct financial benefits of information technology adoption. So, this study explores a logic model (Figure 2) to measure input, activities, output, and outcome of the return on IT investment.

Figure 2.2. Logic Model

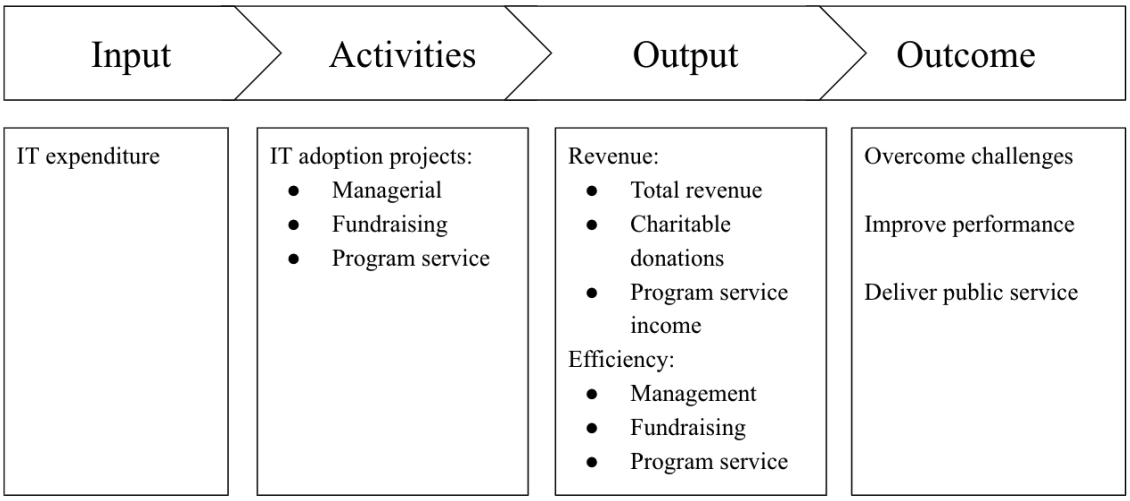

Figure 2.2 shows the logic model of IT investment in nonprofit organizations. The input is the IT expenditure. Following the structure of the 990 form, the investment in IT is grouped into three types, based on the different purposes of the projects. Thus, the activities of the logic model are three types of IT adoption projects, including managerial IT projects, fundraising IT projects, and program service IT projects.

The three types of activities bring financial outputs to the organization. In one way, they earn revenues for the organization in multiple ways. The first groups of outputs are revenue-related, including total revenue, charitable donations, and program service income.

H2.1: Information technology expenditure will increase revenue in nonprofit organizations.

Acquiring additional resources in or through information technology will provide a more competitive advantage for the organization and improve its performance as a whole. Nonprofit organizations are under pressure to communicate effectively and share information transparently with their stakeholders. IT helps to adopt fast communication

channels, overlook the distance in the communication, avoid overcrowding, and choose the appropriate communication medium. For example, IT may smooth the internal management process in a more efficient manner. Technology-supported operations face lower risk, compared to manual operations. Miscommunication can be reduced internally. Implementation of information technology lifts the barrier to collaborations among organizations in the nonprofit sector or across private and public sectors.

H2.1a: Information technology expenditure will increase total revenue.

The input of the information technology budget, especially those in fundraising-related projects, will outreach a broader audience of potential donors with enlarged platforms online and offline. For existing donors, the IT-supported operation improves donor management and provides timely communication with donors and funders. Transparent accounting information positively impacts the individual giving process (Buchheit & Parsons, 2006). Also, information technology provides more options for convenient payment, which offers opportunities for more charitable donations.

H2.1b: Information technology expenditure will increase charitable donations.

Program service-related IT projects create better ways to deliver program service. Computer-mediated communication can help organizations approach more potential clients by bringing people together beyond social, geographic, and religious circles.

H2.1c: Information technology expenditure will increase income from program service.

In the other way, the IT projects save money for the organization by improving efficiency. In the logic model (Figure 2), the second group of outputs is efficiency-

related, including management efficiency, fundraising efficiency, and program service efficiency.

H2.2: Information technology expenditure will improve the efficiency of nonprofit organizations.

Internally, the successful implementation of information technology could reconfigure the organization's structure to reduce managerial costs. With the help of technologies, the manual workforce could be saved. Lower-cost remote work is possible. Also, adopting IT is a way for nonprofits to lift the barriers in internal communication. Successful IT implementation will help to lift the overhead burden of nonprofit organizations. As a result, administrative efficiency can be improved.

H2.2a: Expenditure in information technology will improve management and administrative efficiency.

Information technology is a potential way to improve the efficiency of fundraising with lower costs and higher outcomes. There are many types of fundraising IT tools, such as online crowdfunding platforms, social media fundraising features. The cost of online fundraising can be reduced with the implementation of information technology. Meanwhile, IT improves fundraising output by better targeting the audience and improving the donor turnover. Timely communication between donors and the agency also improves fundraising performance.

H2.2b: Information technology expenditure will improve fundraising efficiency.

Facilitating information technology may improve the efficiency in program service and help nonprofit organizations focus on mission-related projects and lift the operation burden. IT provides opportunities to offer virtual program service, which is at a

lower cost. It also smooths the communication between the organization and its clients so the service can be delivered more efficiently.

H2.2c: Information technology expenditure will improve program service efficiency.

The outcome of IT adoption is to help nonprofits overcome challenges, improve performance, and ultimately deliver better public service.

2.5 Method

2.5.1 Data Sources and Analysis Units

To test the hypothesis, a longitude study is done through panel data analysis. The analysis unit is the individual organizations. Data is collected from IRS Form 990 annual tax filing data for U.S. 501c(3) tax-exempt nonprofit organizations. Secondary databases of 990 data are downloaded from open990.org. For information technology expenses, there are 8 datasets that retrieved information technology-related expenses, including total IT expenses 2009-2012, total IT expenses 2013-2016, program service IT expenses 2009-2012, program service IT expenses 2013-2016, management and administrative IT expenses 2009-2012, management and administrative IT expenses 2013-2015, fundraising IT expenses 2009-2012, and fundraising expenses 2013-2016. General governance data of each organization over the years is available in another dataset. After merging the nine datasets, there were 72,608 observations in the raw data. The tax reporting years in the dataset range from 2010 to 2017.

A few steps were done to validate and clean the dataset. First, if a nonprofit organization terminates before the end of the typical tax year, its tax year will close early. The termination tax reports are excluded from the dataset because they represent operations within less than one year of time. Around 3,500 termination observations are dropped by duplicate checking with tax year and EIN number. Second, to validate the accuracy of the data, total IT expenses are recalculated by adding up the three specific IT expenses. If the calculated total IT expenses do not match the retrieved value, or any of the specific IT expenses is larger than the total IT expense, the observation is dropped. In addition, other variables are validated. For example, observations are excluded if any of the revenues are less than zero. After validating the data accuracy, there are 62,175 observations in the final dataset. Thus, the final sample includes over 9,000 501c(3) nonprofit organizations that report detailed IT expenditures from 2010 to 2017 in Form 990.

2.5.2 Measurement

There are several sets of key dependent variables. First, revenue-related variables include total revenue, charitable donations, and program service revenue. All these three variables come directly from Form 990. Total revenue is located in Part I Line 12; the number is the same as Part VIII Line 12 Column (A). Charitable donations are retrieved from Part VIII Line 1h Column (A), which is the total contributions, gifts, grants, and other similar amounts. It is also available in Part I Summary line 8 current year. Program service revenue is from Part VIII Line 2g Column (A), which equals to Part I line 9 current year.

The second set of dependent variables is calculated variables for efficiency measurement, including fundraising efficiency, program service efficiency, and management efficiency.

Fundraising efficiency measures the cost-benefit ratio in fundraising activities. Previous literature measures fundraising efficiency as the amount of money spent in fundraising with each dollar received from charitable donations (Grizzle, 2015). This study adopts the same measurement: fundraising expenses divided by total contributions. Fundraising expenses are retrieved from Form 990, Part IX line 25 column (D). Charitable donations are the same as the measurement used before. In this measurement, the higher the number of the ratio, the more money spent on each dollar raised, the lower the efficiency.

Program service efficiency is a widely used key performance measurement on nonprofit organization health. It is a ratio that represents the proportion of the total expenditure spent on program service. Program efficiency shows how much the nonprofit organization is focused on fulfilling its mission (Lecy, Schmitz, & Swedlund, 2012). Under the pressure of revealing this information to the public, seven out of ten nonprofit organizations' program service efficiency is higher than 75% (Charity Navigator, 2017). In this study, program efficiency is calculated by total program service expense over total expense. Total program service expenses are the add up from grants and similar amounts paid (Part IX column (A) lines 1-3) and benefits paid to or for members (Part IX column (A) lines 4). These expenses are also available in Part I Summary lines 13-14. The total expenses are retrieved from Part I line 18 current year, which equals the number in Part IX column (a) line 25.

Nonprofit organizations need to balance the program expenses and the overhead cost. Thus, management efficiency is also one of the key performance indicators of nonprofit organizations. It is calculated by administrative expense divided by total expense. In Form 990, there are three groups of expenses in Part IX Statement of Functional Expenses. It includes program service expenses, management and general expenses, and fundraising expenses. The secondary dataset does not include a direct retrieval of the total number of management and general expenses. So, in this study, management expenses are calculated by the total expense less program service expenses and fundraising expenses.

The key independent variables are the information technology expenses. In Form 990 Part IX Statement of Functional Expenses, each specific functional expense is listed in one line and divided into four columns - total expenses (A), program service expenses (B), management and general expenses (C), fundraising expenses (D). Column A is the sum of columns B, C, and D. Information technology (IT) expenses are listed in Part IX line 14. Thus, the independent variables in the models include total IT expenses from line 14 column (A), program service IT expenses from line 14 column (B), management and general IT expenses from line 14 column (C), and fundraising IT expenses from line 14 column (D).

Several organizational variables are controlled, including total assets, number of employees, organization age, and organization type. The number of total assets is retrieved from Part I line 20 End of Year, which equals Part X line 16. The number of employees is collected from Part I line 5, the total number of individuals employed in the current calendar year. This number is also available in Part V line 2a. Organization age is

calculated from the tax year and the year of formation in the Heading section line L. Organization type is coded with ten dummy variables that represent the ten broad categories of the National Taxonomy of Exempt Entities (NTEE) system. The original data is collected from the National Center for Charitable Statistics. The ten categories are Arts, Culture, and Humanities (A), Education (B), Environment and Animals (C, D), Health (E, F, G, H), Human Services (I, J, K, L, M, N, O, P), International, Foreign Affairs (Q), Public, Societal Benefit (R, S, T, U, V, W), Religion Related (X), Mutual/Membership Benefit (Y), Unknown, Unclassified (National Center for Charitable Statistics, 2019).

What are the organizations that report detailed information technology expenditure and are included in the sample? The descriptive statistics in Table 1 show an overview of the critical variables in the model. The minimum and maximum values of the variables show that the sample includes a wide range of organizations. We can see from the median value that most of them are relatively large organizations with a decent size, but their expenses in IT are relatively low. Specifically, the median value of IT expenditures is zero. More than half of the organizations do not spend any money on information technology over the tax year.

Table 2.1. Descriptive Statistics of Variables

Variables		N	Min	Max	Mean	Median
IV	Total IT Expense ($)	62,175	0	224M	342K	1,591
	Program Service IT Expense ($)	62,175	0	224M	223K	0
	Management and General IT Expense ($)	62,175	0	95M	115K	0
	Fundraising IT Expense ($)	62,175	0	3.4M	4K	0
DV	Total Revenue ($)	62,175	0	10,190M	36M	3M

	Total Donation ($)	62,175	0	1,969M	7M	389K
	Total Program Service Revenue ($)	62,175	0	9,792M	26M	775K
	Fundraising Efficiency	50,565	0	4738	0.423	0.013
	Program Service Efficiency	62,175	0	1	0.106	0
	Management Efficiency	62,175	0	1	0.868	0.988
CV	Total Asset ($)	62,175	-72082	24,780M	82M	4.5M
	Age (year)	58,058	0	818	44	33
	Number of Employees	62,175	0	53,526	358	29

The descriptive statistics by organization type in Table 2 tell more information about the wide range of organizations in the sample. Education organizations, international affairs organizations, health organizations, and art organizations are the four types of organizations that spend more on Information technology.

Table 2.2. Descriptive Statistics by Organization Type

Organization Type	Number of Orgs	Total IT Expense	Total IT Expense
Art	3,270	92,716	2,540
Education	10,753	459,590	25,521
Environmental and Animals	1,517	63,569	686
Health	10,417	899,718	7,313
Human Service	15,261	42,597	0
International, Foreign Affairs	670	296,057	9,278
Public, Societal Benefit	7,207	119,396	0
Religion Related	1,591	36,082	0
Mutual/Membership Benefit	1,186	14,813	0
Others	10,303	463,461	5,383

2.5.3 Model

To test the two sets of hypotheses, the panel data is analyzed with fixed effects models. Below are the two equations about organization revenue (H2.1) and efficiency (H2.2):

$$Revenue_{it} = \alpha + \beta_1 ITCost_{it-1} + \beta_2 Asset_{it} + \beta_3 Age_{it} + \beta_4 Employee_{it} + \beta_5 Type_i + \mu_i + \upsilon_t + \varepsilon_{it}$$

$$Efficiency_{it} = \alpha + \beta_1 ITCost_{it-1} + \beta_2 Asset_{it} + \beta_3 Age_{it} + \beta_4 Employee_{it} + \beta_5 Type_i + \mu_i + \upsilon_t + \varepsilon_{it}$$

The subscript *i* represents the organization, and subscript *t* is the tax year. *Revenue* $_{it}$ is the revenue of the organization in the tax year. There are three types of revenue - total revenue (H2.1a), charitable donations (H2.1b), and program service revenue (H2.1c). *Efficiency* $_{it}$ includes management efficiency (H2.2a), fundraising efficiency (H2.2b), and program efficiency (H2.2c) of the organization in the tax year.

IT Cost $_{it-1}$ means the IT expenditure of the previous year of the organization. The time lag is taken because the impact of information technology may not be shown in the same year. To test the most reasonable time lag, fixed effect models are compared with different lag terms from 1 year to 5 years. All six models find significant positive correlations between IT expenses and revenue and efficiency. The one-year lag is selected based on the highest within R-squared of the six models.

Asset, *Age*, *Employee*, *Type* are control variables. *Asset* $_{it}$ represents the total assets of the organization in the current year. *Age* $_{it}$ is the organizational age as of year t. *Employee* $_{it}$ is the number of employees hired in the organization in the current tax year. *Type* $_i$ is the organization type that does not change over time. *a* is the constant; u_i means an organization-specific fixed effect; v_t refers to a time-specific fixed effect; e_{it} is a random error term.

In the analysis, there are 12 models in all to test the two sets of hypotheses. For the first group of hypotheses, H2.1a is tested with Model 1 and Model 2. Model 1 investigates the correlation between total IT expense and total revenues. Model 2 examines the impact of three types of spending in IT - program service IT, management and general IT, and fundraising IT, on total revenue. Hypothesis H2.1b is tested by Model 3 and Model 4. Model 3 tests the impact of total IT expenditures on charitable contributions. Model 4 specifically tests the correlation between three detailed IT spending on total donation. H2.1c is tested by Model 5 and Model 6. Model 5 investigates the correlation between total IT expenses and program service income. Model 6 analyzes the relationship between total program service revenue and the three types of IT expenditure.

Similarly, Model 7 -12 investigates the second set of hypotheses. Model 7 and Model 8 tests H2.2a about the impact of total IT spending (Model 7) and the three types of IT cost (Model 8) on management efficiency. Model 9 and Model 10 test H2.2b about how fundraising efficiency is influenced by total IT (Model 9) and the three types of IT expenditure (Model 10). Model 11 and Model 12 test H2.2c about the correlation between program service efficiency and total IT cost (Model 11), as well as IT spending on the three different purposes (Model 12).

The variance inflation factor (VIF) test is conducted to detect multicollinearity problems. None of the VIF is higher than 2; thus, multicollinearity is not a concern in any of the models.

2.6 Results

Table 2.3 shows the results of the models (1-6) on the impact of IT expenses on revenues. The statistical correlations between the four IT expenses variables and three revenue variables are all significant. Results in Model 1, 3, and 5 show that total IT cost has a positive impact on total revenue, total donation, and total program service revenue. Every dollar increase in total IT expenditures in the previous year leads to a 4.2 dollars increase in total revenue, a 0.2 increase in the total donations, and a 3.7 dollars increase in total program service income of the following year.

Results of models 2, 4, and 6 find positive impacts of the three types of spending in IT, program service IT, management and general IT, fundraising IT on revenues. Generally speaking, most types of IT expenditure have positive impacts on total revenue, total donation, and total program service revenue. For example, in model 2, for total revenue, all three types of IT expenses have a positive impact on it. In model 6, every dollar spent in program service IT brings in more than 3 dollars program service revenue. Every dollar spent in management IT brings in more than 6 dollars revenue in program service.

Table 2.3. Results of Models 1 - 6

	Total Revenue		**Total Donation**		**Total Program Service Revenue**	
	(1)	(2)	(3)	(4)	(5)	(6)
Total IT Expense_t-1	**4.167*** **		**0.218*** **		**3.737*** **	
Program Service IT Expense_t-1		**3.674*** **		**0.249*** **		**3.140*** **
Management IT Expense_t-1		**5.809*** **		**-0.196** **		**6.040*** **
Fundraising IT Expense_t-1		**31.957*** **		**47.616*** **		**-12.484** **
Total Asset_t	**0.139*** **	**0.136*** **	**0.019*** **	**0.016*** **	**0.072*** **	**0.070*** **
Age_t	**287110.3*** **	**279255.9*** **	**58653.04*** **	**48782.63*** **	**205884.8*** **	**206892.2*** **
Number of Employees_t	**19532.9*** **	**19635.71*** **	**2079.482*** **	**2063.761*** **	**17947.72*** **	**18081.56*** **
Art	1136999	1155274	30053.91	37194.91	581839	595550.3
Education	-362974.8	-317569.8	-209992.4	-115988.3	**-1898673*** **	**-1941979*** **
Environmental and Animals	2433.11	71763.09	-829474.4	-691659.9	334115.4	273797.1
Health	**-7035509*** **	**-7106374*** **	**-517600.6** **	**-546816.6** **	**-7928459*** **	**-7980079*** **
Human Service	135196.6	142435.2	-203470	-193254	238962.4	236898.2
International, Foreign Affairs	-127228.1	-97672.89	**-2302922*** **	**-2327181*** **	1399569	1458071
Public, Societal Benefit	**1071881***	**1052458***	-456842.1	-466419.3	**1063067** **	**1050510** **
Religion Related	656842.7	648645.9	-169821.5	-169108.1	429298.5	419175.4
Mutual/Membership Benefit	-913022.8	-953407.3	156208.5	112222.5	-1752225	-1753908
N of Obs	58,058	58,058	58,058	58,058	58,058	58,058
N of Groups (orgs)	9,403	9403	9,403	9,403	9,403	9,403
R square	0.4219	0.4248	0.0363	0.0479	0.3341	0.3414

Note: * p<0.1; ** p<0.05; ***p<0.01

Table 2.4. Results of Models 7 - 12

	Management Efficiency (log)		**Fundraising Efficiency (log)**		**Program Service Efficiency (log)**	
	(7)	(8)	(9)	(10)	(11)	(12)
Total IT_t-1 (log)	-5.95e-06		**0.0181***		0.0125	
Program Service IT_t-1 (log)		**-0.0049****		-0.0083		0.0124
Management IT_t -1 (log)		-0.0001		0.0136		0.0015
Fundraising IT_t-1 (log)		0.0001		**0.0355*****		0.0047
Total Asset_t (log)	**-0.0046***	**0.0113****	**-0.3802*****	**-0.4123*****	**0.0871*****	0.0552
Age_t (log)	**-0.0118***	-0.0237	**0.2454*****	**0.2599*****	-0.1053	-0.0583
Number of Employees_t (log)	**0.0160*****	**0.0284*****	**0.0811*****	0.0502	**-0.0518***	-0.0332
Art	-0.0032	-0.0085	0.0040	-0.0482	0.0939	**0.1374***
Education	**0.0083*****	**0.0091***	-0.0299	0.0072	**-0.0444****	-0.0249
Environmental and Animals	-0.0015	0.0016	-0.0245	0.0069	-0.0648	0.0555
Health	0.0007	0.0008	0.0050	-0.0056	-0.0168	0.0914
Human Service	0.0031	0.0014	-0.0226	0.0006	0.0074	0.0123
International, Foreign Affairs	-0.0010	0.0153	-0.0095	-0.0861	0.0002	0.0586
Public, Societal Benefit	**-0.0090***	-0.0138	-0.0621	**-0.1041****	**0.0885****	0.0291
Religion Related	-0.0013	-0.0120	-0.1059	-0.0889	**-0.1960****	-0.1428
Mutual/Membership Benefit	0.0208	omitted	-0.3480	omitted	0.0136	omitted
N of Obs	29,058	8,899	17,433	8,846	14,835	5,746
N of Groups (orgs)	5,530	2,045	3,446	2,030	3,151	1,385
R square	0.0021	0.0052	0.0182	0.0409	0.0027	0.0032

Note: * p<0.1; ** p<0.05; ***p<0.01; omitted because of collinearity

Money spent on program service-related IT projects can be paid off. Specifically, one dollar increase in program service-related IT costs of the previous year leads to a 3.7 dollars increase in total revenue, 0.25 dollars increase in total donation, and 3.1 dollars increase in total program service revenue of the next year.

IT expenditures in management and general administration increase revenues as well. One dollar increase in the previous year brings in additional 5.8 dollars in total revenue while increasing 6 dollars of total program revenue, though the total donation will be slightly decreased by 0.2 dollars.

Among the three types of IT spending, fundraising-related IT expenditure is worth the cost the most. In model 4, every dollar spent in fundraising IT brings in almost 48 dollars donation. Although the total program service revenue is reduced by 12.5 dollars with each dollar of increase in fundraising IT, the total revenue still increases by 31.6 dollars. The negative impact of fundraising IT cost on program income is potentially caused by the different priorities of organizations that are donation-driven or program-focused.

So, with the results of models 1 to 6 in Table 2.3, the first sets of hypotheses are firmly accepted - information technology expenditures have positive impacts on total revenue, charitable donations, and program service income in nonprofit organizations.

Table 2.4 shows the results of models 7 to 12 that test the impact of IT expenses on the three efficiency-related variables. In short, the second set of hypotheses about efficiency is just partially accepted.

Hypothesis H2.2a, IT expenditures improve management efficiency, is accepted by Model 7 and 8. Management efficiency computes the proportion of total expenditures

spent on management and administrative operations. The total IT expenditures, program service IT expenditures, and managing and general IT expenditures all have a negative impact on the management efficiency ratio. However, only program service IT expenditure has a statistically significant effect on the management efficiency ratio. If the program service IT expenditures of the previous year increase by one percent, the management efficiency decreases 0.5% in the following year. Thus, IT investment in program services will reduce the overhead burden of nonprofit organizations.

Hypothesis H2.2b proposed that IT cost can improve fundraising efficiency. However, the results reject this hypothesis and suggest opposite findings. In the fundraising efficiency measurement, the higher the number, the higher fundraising expense per dollar raised, the less efficient. In Model 9, if the total IT expense increases 1% in the previous year, the fundraising cost per dollar raised will increase 1.8% in the next year. If the fundraising IT expense rises 1%, the fundraising efficiency ratio increases 3.6%. So, Results show that IT costs will worsen fundraising efficiency.

For Model 11 and Model 12 that test Hypothesis H2.2c about the impact of IT spending on program service efficiency, the correlations are positive. IT expenditures of the previous year will lead to a higher ratio of total spending in program services so that the organization is more efficient in utilizing resources for its central mission. However, none of the correlations are significant.

The nonprofit starvation cycle might be a possible explanation for the mixed effects of IT spending on efficiency. In this study, IT adoption is seen as an investment in organizational infrastructure, boosting revenues and reducing administrative costs. However, The nonprofit starvation cycle leaves nonprofits so hungry for a decent

infrastructure that they can barely function as organizations (Gregory & Howard, 2009; Lecy & Searing, 2015). As a result, a small IT input may fill some gap of the starved infrastructure but does not significantly influence the efficiency of the organization as a whole.

In addition, the hidden cost of IT adoption may offset its benefit on efficiency. Adopting information technology requires acquisition costs and implementation costs during the adoption, as well as daily operation costs and upgrading costs after the adoption. It takes time to transit from one established technology to another new technology. Also, implementing an information technology project requires not only money but also many other hidden supporting resources, for example, human resources spent in training on utilizing the new technology. With the fast-paced development of information technology in the 21st century, adopting information technology often leads to costs in consistently upgrading and improvement after the adoption. It will add an overhead burden to the organization. Thus, resources spent on technology projects may drift the mission and reduce the program efficiency in the short run.

2.7 Contribution

This paper will make theoretical contributions to nonprofit literature in multiple aspects. First, it is among the trend of increasing research in technology innovation in the nonprofit sector. It will fill the gaps in measuring and evaluating the benefit of technology for nonprofit organizations. Second, the paper contributes to nonprofit budgeting literature by taking a more detailed look into the effect of functional expenses on the financial performance of nonprofit organizations. It will be one of the early studies

focusing on the neglected information technology expenditure in nonprofits. At the same time, this study will explore a different view in the previous understanding of nonprofit expenses, showing how expenses bring benefits and could be seen as investments in infrastructure.

The findings may also provide suggestions to practitioners in the nonprofit field. COVID-19 reshapes the nonprofit sector and enlarges the challenges they are facing. For example, fewer fundraising campaigns are taking place on the ground. Events are held virtually. Volunteer recruitment is difficult because of social distancing. Internal communication is changing with remote work. Community engagement is challenging with people staying at home. Nonprofit managers are struggling with adopting many kinds of information technology reactively or proactively. With this study, if a suggestion could be made to nonprofit managers who hesitate to invest in IT projects, the short answer is - worth it! The IT cost can be paid off. With a better understanding of the financial benefits of information technology adoption, nonprofit managers may allocate more resources to information technology, even if the budget is limited, as the cost will be paid back. Donors and funders may be more likely to support information technology innovation projects. The nonprofit sector will ultimately benefit from the increasing adoption of information technology.

In addition to the nonprofit literature, the dissertation will join the conversation of management of information system (MIS) literature. Existing MIS literature in IT payoffs focused only on the private sector will benefit from this new ROI evaluation in the nonprofit sector. Information technology should be welcomed not only because it has

monetary value that boosts profits in the private sector. Its social value in the nonprofit sector should not be neglected.

2.8 Limitation and Future Study

The fundamental limitations of the study are rooted in the limits of 990 data. A key limitation is the sample bias. The sample only includes organizations that report the IT expenditure in their tax form. Reporting detailed IT expenditure is not a required part when filing the 990 form. The reporting organizations are naturally the ones that spend more on information technology, or the larger organizations that are equipped with professional accounting staff. In reality, many other nonprofit organizations actively adopt different kinds of technology with low or even zero costs, such as social media. Future studies need to investigate more about the IT adoption for small nonprofits and how the low-cost IT may bring financial benefits and amplify the impact of IT for them.

Meanwhile, the 990 data accuracy concerns have been discussed in previous literature (Gordon, Khumawala, Kraut, & Meade, 2007; Keating & Frumkin, 2003; Yetman & Yetman, 2009). The overhead reporting problem may also exist in IT spending reporting. For example, misreporting for program service IT instead of fundraising IT is possible in the dataset. However, the 990 forms are often the only source that provides the public with financial information about a nonprofit organization. For nonprofit management study organizations across the sector, the 990 forms are usually the only available financial data source.

This study was among the first to dig into information technology expenses in 990 data. The data quality of the IT cost remains uncertain. For example, organizations that

do not spend money on IT usually leave the cell blank when filing the 990. And a lot of organizations just do not report the details of the expenses. So, it is hard to tell the difference between those organizations who really spend zero dollars and those who just do not report the details. Also, the training cost and staff capacity of the IT adoption is not measured in the financial data. However, it should not be ignored. Qualitative studies to hear the story behind 990 forms can be a direction for future studies. Many research questions remain unknown, for example, how do nonprofits spend budget on IT adoption? What are the costly IT projects? What are the costs that are not shown in the tax form?

In addition, the findings in this study confirm that investment in IT projects brings financial returns. In practice, nonprofit managers believe that investment in IT costs will be paid off as well. But what are the other barriers for organizations to implementing new technologies? How can nonprofits strategically allocate limited resources in IT? A lot of questions are waiting for future research.

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Chapter 3

The Impact of Social Media Engagement on Fundraising Performance for Small Nonprofits

3.1 Abstract

Nonprofit organizations adopt social media because it is a low-cost technology and a timely communication platform. But the direct financial return of social media is unknown in the existing literature. How does social media engagement impact fundraising campaign performance for small nonprofit organizations? The study samples 100 small nonprofits that disclosed their 2020 Giving Tuesday campaign performance on Twitter and scraps their Twitter account activities using a computational social science method. The impact of account activeness and engagement on fundraising campaign outcomes is investigated in multiple periods - within the #GivingTuesday hashtag, one week, one month, one year, and since establishment. Results find mixed effects of social media engagement on fundraising performance. The study adds to the nonprofit literature on communication effectiveness, signaling and reputation building, and public engagement. The findings also provide implications for nonprofit practitioners regarding how to effectively manage social media strategies.

3.2 Introduction

Nonprofit organizations face many challenges nowadays in modern society. They are under pressure to function well with limited resources. Among them, small nonprofit organizations, struggling with a lack of workforce and funding, suffer the most.

Being part of modern society, nonprofit organizations have witnessed the fast development of information technology, among which social media has become a very popular communication tool in people's daily lives. Social media is not only a timely communication platform, it also offers two-way conversation opportunities between organizations and the audience. Nonprofit organizations benefit from the use of social media in many ways, such as marketing, communication, fundraising, engagement, and volunteer management.

Small nonprofit organizations see the opportunities in social media as well. Establishing a social media presence is free of charge. Thus, it becomes a major marketing tool for small nonprofits to establish and maintain a public image and tell their stories. Though most social media platforms are free, the cost of managing an organizational account cannot be ignored. The input mostly lies in human resources. Large scale nonprofits may hire social media managers, while in small nonprofits, many times interns or volunteers are managing the social media accounts. As a result, it is hard for small nonprofits to maintain consistently active social media accounts. Many times, when specific needs arise, for example, during fundraising campaigns, nonprofit managers put more resources into social media management.

In practice, managers in small nonprofit organizations see social media as a free tool to potentially bring free returns, no matter high or low. However, as it is usually difficult to measure the output of social media management input, nonprofit managers are uncertain about how to strategically allocate resources to social media and whether an investment in social media is a worthy decision. To solve this puzzle, this study aims to

evaluate the outputs of social media investment for small nonprofit organizations, focusing on measuring the direct financial returns in fundraising campaigns.

Thus, the overall research question of the study is, how does social media engagement impact fundraising campaign performance for small nonprofit organizations? With the support of communication theory and signaling theory, the study hypothesizes that social media engagement has both short-term and long-term benefits to fundraising outcomes.

The study samples 100 small nonprofit organizations that disclosed their 2020 Giving Tuesday campaign performance on Twitter and scraps their Twitter account activities using a computational social science method. The impact of account activeness and engagement on fundraising campaign outcomes is investigated in multiple periods - within the #GivingTuesday hashtag, one week, one month, and one year. Results find mixed effects of social media engagement on fundraising performance. The study provides implications for nonprofit practitioners regarding how to allocate resources in social media. It also adds to the nonprofit literature on communication effectiveness, signaling and reputation building, and public engagement.

3.3 Literature Review

3.3.1 Social Media as a Communication Tool

As social media becomes one of the main platforms for communication, researchers have been starting to focus on the emerging literature that social media, rapidly replacing traditional media outlets, dramatically facilitates the delivery of news

and exchange of information (Dwyer & Martin, 2017; Rosengard, Tucker-McLaughlin & Brown, 2014). Social media allows communication to a broader audience and enables connections among wireless users. Compared to traditional platforms, social media as a new media instrument has two characteristics. First, online sources can be ideal for generating timely communication (Taylor & Perry, 2005). It allows users to communicate synchronically, helps individuals share information, and furnishes evaluations instantly compared to traditional platforms (Bratu, 2016). Second, it offers interactive, two-way conversations with audiences (Seltzer & Mitrook, 2007).

Among the different kinds of social media platforms, Twitter has a unique set of technical specifications that allow both consumers and producers of the tweet to developing varied and effective engagement mechanisms. There are two major features, the brevity of no more than 140 characters in each tweet and multiple access portals, including desktop computers, laptops, smartphones, and tablets (Twitter, 2021). First, the brevity of tweets encourages Twitter users to post instantaneous updates. It also speeds up information diffusion as users do not need to invest much effort and time in content crafting (Wang, 2016). Having to be short, tweets posted need to be accurate and powerful enough to engage near real-time responses to current events, thus adhering to possible information exchange. Second, the multiple access portals enable wider and instant public engagement. The organizational accounts could have larger-scale impacts, as the spectrum of Twitter accounts ranges from citizens to public officials, political figures, nonprofit and for-profit organizations, and many more (Su, Scheufele, Bell, Brossard & Xenos, 2017). Given the importance of nonprofits' transparent

communication strategies, social media's bidirectional potential can further engage stakeholders.

3.3.2 Social Media for Nonprofits

Social media is an effective communication tool for nonprofit organizations. It allows nonprofit organizations to interact directly with their key stakeholders, without relying on media organizations as intermediaries (Guo & Saxton, 2014; Lovejoy, Waters, & Saxton, 2012; Nah & Saxton, 2013). Social media represents a new platform for stakeholder relationship management, being an affordable option for participatory two-way communication with geographically dispersed audiences (Campbell, Lambright, & Wells, 2014; Maxwell & Carboni, 2016; Waters, Burnett, & Lucas, 2009). Nonprofit organizations benefit from the use of social media in many ways. (Valentini, 2015).

Previous literature focuses on the net benefits of a nonprofit's marketing, communication, fundraising, engagement, and volunteer management (Campbell, Lambright, & Wells, 2014; Guo & Saxton, 2018; Svensson, Mahoney, & Hambrick, 2015). For example, Lovejoy, Waters, & Saxton (2012) found that social media can function as a listening post for nonprofit organizations to gain critical knowledge of their community. Lovejoy and Saxton's (2012) study reveals three critical functions of microblogging updates—share information, build community, and call for action. Nonprofit organizations use Twitter to strategically engage their stakeholders via dialogic and community-building practices than they have with traditional websites.

Many of the discussions of social media's impact on nonprofit organizations revolve around secondary outcomes such as page likes, tweets, friends, etc. The

connection with key tangible nonprofit outcomes is less well established, especially those that apply to nonprofits in particular, compared to their counterparts in the private sector, such as fundraising and volunteer recruitment. It is unclear if the standard metrics of social media relate to these necessary considerations.

3.3.3 Social Media Fundraising

Di Lauro's (2019) research team conducted a systematic literature review about the nonprofits' social media usage for fundraising. Generally speaking, there are two types of strategies for nonprofits' social media usage for fundraising. The first strategy focused on generic social media management for nonprofits' fundraising, such as maintaining community uploading information, and interaction with stakeholders. The second strategy looked into the management of specific social media fundraising campaigns.

Social media fundraising literature indicates that the benefits nonprofit organizations can obtain from using social media for fundraising include increased transparency and accountability, operational, involvement and engagement, and improved organizational image. The causal mechanism relies on the idea that nonprofits often operate in markets with high information asymmetry, where product or service quality cannot be observed before donation (Cnaan, Jones, Dickin, & Salomon, 2011). Combined with a high level of information asymmetry, a positive "endorsement" from a trusted connection in a user's network can play an important role in a potential donor's charitable giving decision (Wiencierz, Pöppel, & Röttger, 2015). Lee (2021) finds evidence for online popularity reducing information asymmetry between an organization

and its stakeholders by establishing a positive correlation between the number of likes on Facebook and a nonprofit's charitable contributions. The paper suggests that the nonprofit's social media popularity increases the organization's trustworthiness. As nonprofits depend on the willingness of people to donate time and money, social media can help nonprofits connect with potential donors, convey fundraising messages economically to the target audience, and often collect donations online (Sura, Ahn, & Lee, 2017).

Harris, Neely & Saxton's (2021) study evaluates the financial returns on nonprofits' social media investment. They also find that social media can substitute for traditional fundraising expenditures. Bhati and McDonnell's (2020) study tests the effectiveness of using Facebook for online fundraising initiatives and finds a positive impact of social media usage by nonprofits on their fundraising success.

However, a limitation of the previous literature is that the impact of social media engagement on fundraising outcomes is indirect. The financial returns are mostly measured by the annual revenue or the annual charitable donation, resulting from combined fundraising channels including social media. Thus, further study on the direct financial outputs of social media fundraising is needed.

Through Twitter, fundraising can coalesce around hashtags like #iGiveLocal and #GivingTuesday, helping organizations leverage donations (Phillips, Bird, Carlton, & Rose, 2016). This is aided indirectly through networking that enables matching community members and donors with organizational needs (Waters, Burnett, & Lucas, 2009). However, there still needs to research on whether and how nonprofits' input of

engagement on Twitter could be paid off by directly attracting donations for the organizations.

3.3.4 The Fundraising Inputs and Donations

Social media portfolio is part of the information technology infrastructure of nonprofit organizations. Though the monetary cost of using social media in fundraising is relatively low, if not zero, donors may still perceive the related fundraising input and administrative cost. As donation behaviors are impacted by overhead costs, to evaluate the fundraising input on social media and its return from the donations, we need to review the existing literature about the fundraising inputs and their impact on donations in nonprofit organizations.

Fundraising input in the existing literature is widely discussed as part of the overhead cost. Though researchers found mixed impacts of fundraising costs on revenues and efficiency (Trussel & Parsons, 2007; Calabrese, 2020), a major voice of nonprofit literature supports that overhead rates are negatively associated with donations (Jacobs & Marudas, 2009; Tinkelman & Mankaney, 2007). Empirical studies find that donors are influenced by the fundraising cost on the financial statement (Khumawala, Parsons & Gordon, 2005). Because of the public overhead aversion, in order to keep donations, nonprofits have to minimize their cost in general management, or "reported" fundraising costs. The underreporting of fundraising costs is supported by the evidence found in Krishnan's (2006) study. Grizzle (2015) finds that donors are sensitive to fundraising efficiency, though spending on fundraising generally positively correlates with a higher donation.

However, Young and Steinberg (1995) argue that a certain amount of input in fundraising is needed, as simply reducing fundraising costs is not sufficient to raise donations. Also, fundraising inefficiency may increase the regulatory and compliance costs for nonprofit organizations (Steinberg & Morris, 2010).

Existing literature about how fundraising inputs impact donations have some limitations. For instance, the studies mostly focus on the monetary costs of fundraising. Many other fundraising inputs, for example, labor and networks are not widely discussed. Also, the fundraising outputs are usually observed during a longer period through measurements of annual donations or total revenues. As a result, the fundraising cost and benefit are usually evaluated at a broader organizational level.

3.4 Research Question and Hypotheses

Previous researchers have investigated many kinds of the impact of social media on fundraising performance, while few studies have focused on small nonprofit organizations. For small nonprofits, their funding relies heavily on donations, while the fundraising budget and human resources are limited. Though having an overall organizational fundraising strategy is essential to building the capacity of the nonprofit, the small nonprofits with fewer resources may not be capable to do so. Instead, they have the strength of being flexible and innovative in using fundraising campaign tools with lower adoption costs. In this case, social media is an affordable technology that may bring financial benefits and improve fundraising performance.

Unfortunately, very few studies have evaluated the fundraising inputs and its direct campaign outputs. Ideally, bringing direct benefit at a low cost is something that

donors may be in favor of. Social media is a lower-cost organizational infrastructure and fundraising tools may be welcomed by donors. But it remains uncertain from existing literature whether the investment in social media can bring direct fundraising outcomes. So, this study asks, how does social media engagement impact fundraising campaign performance for small nonprofit organizations?

Communication theory identifies the barriers to effective communication and the means of overcoming them to achieve effective communication. Communication barriers are caused by environmental, physical, semantic, attitudinal, and varying perceptions of reality. Adopting information technology is a way for nonprofits to lift the barriers in internal and external communication. It helps to adopt appropriate fast communication channels, overlook the distance in the communication exercise, avoid overcrowded incommodious, and choose the appropriate medium. The advantages of Computer-Mediated Communication (CMC) include immediate feedback, rich resources from the collective information globally, effective communication, and bringing people together beyond social, and religious circles. As a form of CMC, social media facilitates timely, open, flexible, and transparent communication between nonprofit organizations and their stakeholders. In the context of fundraising campaigns, effective communication on social media leads to a broader audience, more active engagement, and ultimately better fundraising outcomes.

So, the first hypothesis of this study is that:

H3.1: Social media engagement has a short-term positive impact on donations in fundraising campaigns for small nonprofit organizations.

Signaling theory assumes that formal and informal signals shape individuals' attitudes and behaviors (Connelly, Certo, Ireland & Reutzel, 2011). This theory helps describe the behavior when the sender and receiver have access to different information. In this model, the nonprofit organizations as the senders must choose whether and how to communicate the signal on social media. Donors as the signal receivers interpret the signal based on the Twitter account activities of the organization. In the context of making rational charitable donations decisions, individuals will often look for signals that help evaluate the trustworthiness of nonprofit organizations. It takes time for nonprofits to build their images on social media so that they can send out a positive signal to donors in fundraising campaigns.

So, the second hypothesis is that:

H3.2: Social media engagement has a long-term positive impact on donations in fundraising campaigns for small nonprofit organizations.

In short, this study hypothesizes that social media engagement has a positive impact on fundraising performance in fundraising campaigns for small nonprofit organizations. In short term, social media spread the fundraising campaign information to a wider audience and react to voices from the audience in a timely manner. In long term, social media build the reputation of nonprofit organizations, and the good images donors perceived from well-established organizational accounts on social media bring in more donations.

3.5 Methodology

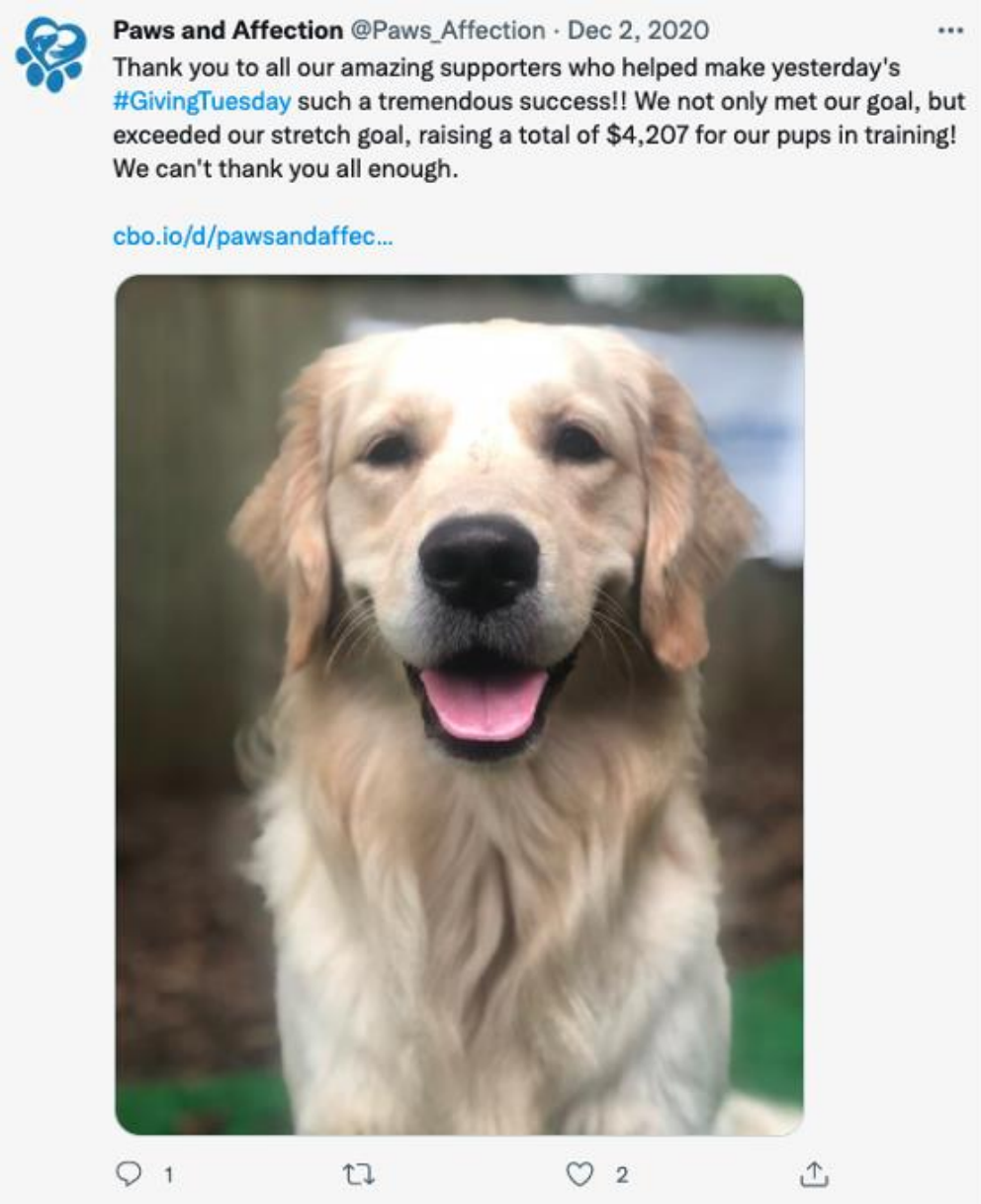
Focusing on the small nonprofit organizations with total assets of less than $500K, the study investigates their organizational engagement on Twitter. Using data from the 2020 Giving Tuesday fundraising campaign, regression analysis models test the short-term and long-term impact of social media account images and their activeness on fundraising outcomes.

3.5.1 Data Collection

Data is collected using Twitter API on the Giving Tuesday campaign of 2020. All of the tweets on Twitter under the #GivingTuesday tag three days before and after December 1st, 2020 are scrapped. The total number of tweets is 238,505. Within the big data, all the nonprofit's official accounts that disclose their GivingTuesday fundraising campaign outcomes can be filtered by keywords in their tweet text.

For example, the screenshot in Figure 1 is a tweet under #GivingTuesday. It's an animal protection nonprofit named Paws and Affection. It posted a tweet on Dec 2nd, announcing the fundraising campaign outcome, saying "Thank you to all our amazing supporters who helped make yesterday's #GivingTuesday such a tremendous success!! We not only met our goals, but exceeded our stretch goal, raising a total of $4,207 for our pups in training! We can't thank you all enough."

Figure 3.1. An example of #GivingTuesday tweet in the dataset



Tweets that announce the fundraising campaign outcomes are randomly selected. Then, the nonprofit organizations posting the selected tweets are identified. By checking the organization's most recent 990 tax form available on Guidestar, 100 small nonprofit organizations with total assets under $500K are selected in the sample.

After the sample selection, Twitter API is used again to scrape the most recent 3,200 tweets of the 100 sample organizations. Then, the subsets of tweets in four time

periods are retrieved from the historical tweets posted by the 100 small nonprofits. The first time frame is one year before Giving Tuesday, from December 1st, 2019 to December 3rd, 2020. The one-month-before-campaign period is from November 1st, 2020 to December 3rd, 2020. The subset of the one-week time frame is from November 24th, 2020 to December 3rd, 2020. The shortest term is during the Giving Tuesday campaign, which includes only the tweets with the #GivingTuesday hashtag in 2020. The datasets were reframed, combining Twitter data and the organizational data from Guidestar that was retrieved from the most recent 990 forms. The unit of analysis becomes individual nonprofit organizations.

3.5.2 Variables and Descriptive Data

Regression analyses are conducted to investigate the correlation between fundraising campaign outcomes and Twitter engagements. The analysis is done in 5 time frames, including overtime since the establishment of the account, one year before the campaign, one month before, one week before, and under the #GivingTuesday hashtag (during the campaign). This section explains the variables and the descriptive data of each variable.

The dependent variable is campaign amount, the dollars of donation the organization disclosed in their tweet text. For example, in Figure 1, the organization received $ 4,207 during 2020 Giving Tuesday campaign. As shown in Table 3.3, the sample organizations receive an average of $10,152.94 in donations during the campaign. The minimum is $150, while the maximum is $48,164. The median donation amount is $6164.5.

There are two groups of independent variables. The first group of independent variables is account-related variables on the day the data was scrapped. Table 3.1 shows the descriptive data of the account-related variables.

Table 3.1. Descriptive statistics of account-related variables

Account Variables	Min	Max	Mean	Median
Followers	7	24750	2141.68	821.5
Friends	1	5001	803.15	465.5
Listed	0	385	48.7	20
Statuses	38	11120	2734.02	2039
Likes	2	35827	1805.2	516
Account age	0.25	12.85	8.09	8.99
Verified	4 (total)			

The first account-related variable is the number of followers, which means the number of accounts that follow this organizational account. The variable measures the size of the direct audience of the tweets. In the sample, there are influential accounts with thousands of followers or even more, as well as the less heard account with as little as 7 followers.

Second, is the number of friends, meaning the number of accounts the account is following. This variable show the network and information resource of the organization. The maximum number of friends is 5,001, while the minimum is just 1. The average number of accounts the organizational accounts are following is around 803, with a median of 466.

The third account-related variable is the number of lists the account was part of. A list is a curated group of accounts organized by users followed by categories that users define. Lists will help the accounts to be linked with similar accounts so that the network could be expanded. While ranging from 0 to 385 lists, the sample accounts are included in an average of around 49 lists for each account.

Fourth, the number of statuses, meaning the total number of tweets since the establishment of the account, as well as the total number of likes it has ever received, offers a historical view of an account's activeness. The most active account has posted 11,120 tweets since its establishment, while the quietest account posted only 38 over time. The sampled accounts have posted a median of 2,039 tweets and an average of 2,734 tweets since the first day of creating the account.

Fifth, the number of likes the account received in total since establishment. Any audience of the tweets posted by an organization can click on "like" no matter if they are a follower of the account. Thus, this variable measures the public endorsement of the organization received on Twitter. Among the 100 sample organizations, the most-endorsement organization has 35,827 likes over time, while the least one has only 2 likes. An account received 1,805 likes on average since its establishment.

Sixth, the account age is calculated by the number of years from the establishing date of the account to Giving Tuesday 2020. The higher the number, the earlier the account was established. The longest-history account has been established for 12.85 years, while the newest account was created in the same year of the campaign. On average, the account age is around 8 years.

Last, verified means whether it is a verified account. Twitter verification means an account of public interest is authentic. A notable and active organizational account can apply for verification of identity from Twitter for free. A verified account has a blue checkmark next to the display name throughout the app. The verification process is to encourage and maintain trust between users on the platform. Thus, a verified account is more trustworthy from a donor's point of view. Only four of the 100 organizational accounts are verified. A potential explanation is those small organizations are less likely to be targeted by scam activities and there are not many fake accounts or phishing accounts with a similar name. So, it is easier for the user to locate the organizational account even if the account is not verified. As a result, the marginal benefit for small organizations to apply for verification is relatively low.

The second group of independent variables is the activeness of the organizational accounts within each of the timeframes, including the total number of tweets, the total number of retweets, the number of likes, and the median text length. For the first three variables, as explained before, the larger the number, the more active the account is during the timeframe. For the last variable, median text length, the larger the number of characters, the longer tweets the account post the more information is communicated.

For illustration, using the same example in Figure 1, the organization named "Paws and Affection" posted 174 tweets one year before 2020 Giving Tuesday campaign. The average length of the 174 tweets is 169.5 characters. The account received 18,236 retweets and 163 likes for all the tweets posted over the year. One month before the fundraising campaign, the account posted 133 tweets with an average length of 183 characters. It received 5 retweets and 112 likes since November 1st, 2020. Under the

#GivingTuesday hashtag in 2020, it posted 6 tweets, receiving 1 retweet and 8 likes in total.

Table 3.2 shows the descriptive data of the activeness-related variables in the four different timeframes. One year before the campaign, among the 100 small nonprofits, 1,593 tweets were posted by the most active account, while the least active one posted only 6 tweets. On average, an organization post 327 tweets during the year, which is less than one tweet a day. The mean value of the total number of retweets is very high. It may be influenced by a few influential tweets in the dataset. From the median value, we can see that during the year, a medium organizational account receives around 600 retweets and 290 likes.

Table 3.2. Descriptive data of activeness-related variables in four timeframes

Variable	Min	Max	Mean	Median
One year before the campaign				
Statuses	6	1593	327.03	269
Retweets	0	2863430	59997.59	603
Likes	0	17901	1108.44	292
Length	52	279	190.08	185.25
One month before the campaign				
Statuses	4	245	40.67	31
Retweets	0	71836	1847.01	17.5
Likes	0	2334	124.7	28
Length	55	279	206.46	217.75
One week before the campaign				
Statuses	3	98	17.73	14

Retweets	0	36960	693.62	7.5
Likes	0	1628	51.8	11.5
Length	57	279.5	209.595	222.5
During the campaign (Under #GivingTuesday hashtag)				
Statuses	1	19	5.12	4
Retweets	0	124	4.35	1
Likes	0	143	9.79	4
Length	102	285	234.085	239

One month before the campaign, the activeness of the accounts improves. On average, more than one tweet is posted per day for each account. The median length of the tweets increases, compared to the one-year statistics. The median value of likes shows that the organizations are receiving more endorsements, averaging almost once per day. The range of retweets is larger than likes, with a median of 18 retweets per account over the month.

One week before the campaign, the small nonprofit accounts are getting more active on Twitter. On average, they post two or three tweets every day during the week. The tweets length slightly increases compared to the one-month numbers. Meanwhile, the organizational accounts receive a higher number of retweets and likes over the week than one month before the campaign.

When it comes to the campaign day, under #GivingTuesday hashtag, the accounts become more active than usual. The most active account posted 19 campaign-related tweets. Even the least active account post one tweet using the campaign hashtag. The organizations post more than 5 tweets on average. The tweets directly related to #GivingTuesday campaign are relatively longer, with an average of more than 230

characters. Interestingly, their campaign-related tweets receive more likes, but fewer retweets than other recent tweets. Under the hashtag, the median number of likes of the accounts is 4, but the median number of retweets is just 1. It shows that audiences are more likely to encourage the organization to post fundraising tweets, but less likely to help them spread the word using their own network.

Organizational variables are controlled, including organization age, total revenue, total asset, and type of organization. The first three variables are continuous while the organization types are dummy variables. These secondary data are collected from the most recent public record of governance data on Guidestar.

Table 3.3. Descriptive statistics of dependent variable and control variables

Variable	Min	Max	Mean	Median
Dependent Variable				
Campaign amount	150	48164	10152.9437	6164.5
Control Variables				
Org age	1	43	13.88	12
Total revenue	1901	3993568	581564.7	387746.5
Total asset	2627	496904	242979.4	225319.5

Table 3.4 shows the distribution of the organizational types. Human service organizations are the largest group, which counts for 39 of the 100 sampled small nonprofit organizations. Twenty-three of the nonprofits are health organizations, twenty of them are public and societal benefit organizations, and eighteen of them are working for the environment and animals. For art, education, religion, and international organizations, there are fewer of them in the sample. The range of organization types

reflects the distribution of the nonprofit sector. The total number of organizations is larger than 100 because some organizations work in multiple fields and have multiple NTEE codes, thus, they are calculated multiple times.

Table 3.4. The number of samples in each organization type

Organization Type	Number of Organizations
Art	12
Education	7
Environmental and Animals	18
Health	23
Human Service	39
International, Foreign Affairs	3
Public, Societal Benefit	20
Religion Related	5

3.6 Results and Discussions

Table 3.5 displays the OLS regression analysis results for the five models. Each model presents the impact of activeness-related variables and account-related variables on campaign amount in a different time period. The positive correlations are visualized in green while the negative correlations are in red. Mix results can be told from a brief glimpse. Some engagement on Twitter brings in campaign donations, while some other engagements decrease the outcome. Both hypotheses are partially supported. Social media engagement has a mixed impact on the donation in fundraising campaigns for small nonprofit organizations from both short-term and long-term perspectives.

Table 3.5. Regression Results

	Dependent Variable: Campaign Amount (log)				
	Hashtag	One Week	One Month	One Year	Overtime
Independent Variable					
Total # of Tweets	0.0154	0.0050	-0.0001	-0.0006	0.0008
Total # of Likes	0.0196 ***	0.0020 **	0.0008 **	0.0002 ***	-
Total # of Retweets	-0.0304 ***	-0.0001	0.0000	0.0000	-
Median Text Length	0.0002	-0.0015	-0.0007	-0.0014	-
Twitter Account					
# of Followers (log)	0.0176	0.0800	0.0311	-0.0924	0.1635
# of Friends (log)	0.1014	0.1228	0.1512	0.2345 *	0.1000
# of Listed	-0.0005	-0.0003	0.0002	0.0001	-0.0013
# of Status (log)	-0.0067	-0.1947	-0.0662	0.1236	-0.3189
# of Likes (log)	0.0120	-0.0004	-0.0743	-0.1318	0.0064
Account Age	-0.0061	0.0382	0.0148	-0.0226	0.0493
Verified	-0.5151	-0.3369	-0.3237	-0.4024	-0.2040
Control Variables					
Org Age	-0.0150	-0.0227	-0.0258 *	-0.0251 *	-0.0195
Total Revenue (log)	0.1236	0.2007 *	0.1893 *	0.2071 **	0.2553 **
Total Asset (k)	0.0021 **	0.0018 *	0.0020 **	0.0022 **	0.0017 *
Org Type					
Art	-0.3912	-0.4074	-0.4911	-0.5140	-0.5061
Education	-0.0615	-0.1219	-0.1057	-0.2024	-0.0947
Environmental and Animals	-0.1243	-0.0541	-0.1245	-0.3391	-0.0696
Health	-0.3460	-0.2057	-0.2467	-0.3716	-0.2511
Human Service	-0.3673	-0.3528	-0.4041	-0.5362 **	-0.4126
International, Foreign Affairs	0.2738	0.2143	0.3425	0.3635	0.0700
Public, Societal Benefit	0.3084	0.1055	-0.0051	0.0237	0.1477
Religion Related	0.1536	-0.4298	-0.4469	-0.4530	-0.4713
_cons	6.2592	6.3837	6.3131	5.9526	5.7216
N	100	100	100	100	100
R square	0.3887	0.3509	0.3414	0.3724	0.3082

*P<=0.1, **P<=0.05, and ***P<=0.01.

During the Giving Tuesday campaign, the total number of likes an account receives positively influences the campaign outcome. Every like the account receives for its tweet under #GivingTuesday hashtag increase the total campaign amount by 1.96%. The correlation is statistically significant at the 0.01 level. However, retweeting negatively correlated with the campaign outcome. Every retweet the account receives decreases the campaign amount by 3.04%. Though statistically not significant, tweeting frequency and text length positively impact campaign performance.

For the Twitter activities one week before Giving Tuesday, the total number of tweets and likes positively correlated with the campaign donation amount. Especially, the total number of likes a nonprofit account receives one week before the campaign significantly increases the fundraising outcome. Every like during the week brings a 0.2% increase in Giving Tuesday donations. The total number of retweets and median text length slightly decrease the campaign outcome. However, the negative correlation is not significant statistically.

In the one month before the Giving Tuesday timeframe, the donation is positively correlated with only the number of likes among the activeness-related variables. Every like received during the month increased the campaign outcome by 0.08%. The correlation is significant at the 0.05 level. Surprisingly, tweeting frequency, tweet length, and retweets received one month before the campaign all slightly decrease the campaign outcome.

The Twitter activities tracing back to one year before Giving Tuesday also have mixed influence on the campaign outcome. Similar to the other time frame, the number of likes positively increased the donation. One additional like on Twitter over the year significantly increases the Giving Tuesday donation by 0.02%. The total number and median length of tweets during the year negatively correlated with the donation amount. For the account-related variables, the total number of friends starts to show a positive impact on donations in the one-year time frame. Every one percent increase of the accounts' friends increases the donation outcome by 23.45%.

Looking into the overtime impact of Twitter account activities since account establishment on the specific campaign day performance, none of the activeness nor

account variables are statistically significant. Among the account-related variables, the number of friends is the only variable that has a consistent positive correlation with donation amount among the five models.

What are the most influential social media engagement that matters most for fundraising campaigns? Comparing the effects of each independent variable across the five models, two variables have a positive impact on the donation amount in the Giving Tuesday campaign. One is the number of likes within the four periods. It indicates the quality of the tweets and the effectiveness of the communication. The second one, as mentioned before, is the number of friends, which indicates the online network of the organization.

There are some interesting or surprising findings among the results that do not support existing theories and understanding of social media. For example, social media as a form of computer-mediated communication approach lifted barriers identified by communication theory in many ways. However, more effective communication is not ensured by using social media. On one side, nonprofits adopt social media to broaden the audience and improve engagement with the public. Nonprofit organizations may believe tweeting is a low-cost and nothing-to-lose strategy for fundraising. However, this study finds that the frequency of tweeting and the length of tweets have mix impact on fundraising campaign outcomes. On one side, tweeting eliminates information asymmetry, and disclosing information improves transparency and trustworthiness, but on the other side too much information reduces the marginal effect, or it may even hurt fundraising outcomes. So organizations need to find out a balance point.

The findings also challenge the signaling theory. The theory argues that audience or signal receivers may look for hidden clues or perceivable indicators when making decisions. Many social media studies support that a well-established social media account sends positive signals to the public and donors, which in turn brings more donations. In practice, nonprofit organizations may invest time, money, and workforce to build their account page. An extreme example is that some organizations may purchase batches of followers on Twitter through social media marketing companies. However, according to the results, this effort may not lead to the expected outcomes. The account-related variables do not significantly improve the fundraising performance of small nonprofits. There are a few possibilities. First, the account signals may not be perceived by donors. Even perceived, the information may not influence their donation behavior. Another possibility is that the donors perceived a higher administrative burden through an established and influential social media account. This factor is more sensitive for small nonprofit organizations. Thus, the overhead aversion may offset the positive impact of a reputational image of the organization when donation decisions are made by the public.

Another surprising finding is the contrast effects of likes and retweets. The total number of likes has a positive impact on fundraising outcomes. However, The total number of retweets has a negative impact on the campaign amount. Although both likes and retweets are positive feedback from the audience of a fundraising tweet, they have different impacts on fundraising outcomes. Why? One potential explanation is, that retweeting a tweet from a nonprofit organization can be considered a behavior of donating time and personal networks. Also, if retweeting a campaign tweet, donors may expect this retweeting to impact people from their network to donate, so they may donate

less out of their own pocket. This interesting finding supports the pure and impure altruism theory in previous philanthropy studies that donors are motivated either by a desire to help other people when giving to a nonprofit, or an emotional happiness about individual contribution. By voluntarily helping to spread the word and publicly showing support for a fundraising campaign, the behavior of retweeting is sufficient to bring a "warm glow" to the retweeter. So the actual donation behavior is not psychologically needed. Meanwhile, when donors care about the ultimate outcome of the fundraising, the expected giving made by the audience of the retweet may crowd out the actual donation given by the retweeters.

There are some limitations of the study. First, the data is collected from one particular fundraising campaign. The Giving Tuesday fundraising campaign takes palace not only on Twitter but also offline and through other online channels. There may be other unobserved factors that impact the fundraising outcome that is not included in the analysis. Also, the organizations may manipulate their fundraising outcome in the announcement to build a better public image. For example, some organizations may include the match fund in their total amount. Some organizations may count other recent donations into their Giving Tuesday campaign. Because of that, although the initial idea of the Giving Tuesday campaign was for one day, many organizations are extending their campaign from weeks before Thanksgiving till the end of the year. Whether extending the campaign timeline improve their fundraising performance or not remains unknown.

3.7 Conclusion and Implications

Social media engagement has a mixed impact on fundraising campaign outcomes. Social media endorsement has both short-term and long-term positive impacts on fundraising performance. The number of likes a nonprofit received on Twitter has increased the campaign donations consistently during different time frames, from one day to one year. The positive impact of social media networks is more obvious from a longer-term perspective. However, the frequency of engagement and the amount of information included in the communication does not always bring positive results. During the fundraising campaign, social media volunteering may crowd out the donations and negatively influence the fundraising outcomes.

The study makes a few theoretical contributions to the nonprofit literature. First, the empirical findings take a more detailed look and respond to previous literature about nonprofit social media engagement. It fills in the literature gap on the direct financial impact of social media engagement. By investigating the donation amount of the fundraising campaign, the study evaluates the direct effect of social media investment on fundraising outcomes. Also, the study identifies the uniqueness of small nonprofit organizations and focuses on this marginalized group in nonprofit social media studies. The findings support the argument that small nonprofit organizations are different from large ones. Their social media strategies should not purely follow the patterns of the well-established large organizations. Second, the mixed findings add to the communication theory that lifting communication barriers is not enough for social media engagement. To achieve a better fundraising performance, the quality of information delivered to the audience matters more than the quantity of it. Third, the empirical findings add to the signaling theory that the organizational influence on social media may not be a strong-

enough signal for attracting donations. For small nonprofit organizations, the donors may not receive the signal of the organization's capacity input to active social media engagement, or the signal is not strong enough to impact their donation behavior. In addition, the findings about the negative impact of retweeting on fundraising campaign outcomes offer empirical evidence to altruism theory in charitable donations. Donating time and personal networks to support nonprofit organizations for fundraising campaigns may crowd out the actual giving paid out of pocket.

There are some remaining puzzles from the current study that are worth future research. For example, social media engagement with high quality positively influences fundraising outcomes. Then, how do nonprofits strategically allocate resources in social media to ensure a balance of quality and quantity of engagement and information? The questions raised from the surprising and interesting findings also open a door for more future research. For example, why the frequency of tweeting does not increase or sometimes decrease the donations? What is the turning point for the quantity of information to positively impact fundraising performance? Why does the number of likes increase donations, but the number of retweets decreases giving? How do the psychological mechanisms of retweeting and liking differ from each other?

This study provides some management implications for nonprofit practitioners. First, the impact of social media engagement on small nonprofit organizations is different from the large nonprofits. Building an influential social media account may help with building a reputation, but it is not always a good thing for small nonprofits. Some engagement, for example, retweeting, brings some negative impact on the fundraising outcomes. Second, for small nonprofits, social media engagement provides more short-

term benefits than long-term impacts for fundraising campaigns. It doesn't matter if the organization has a well-established account. The investment in social media produces an immediate return on fundraising outcomes. The effects of some of the engagements, for example, the likes received on Twitter, last for a longer time. Third, social media engagement is not about the amount of information, but the quality of the information. Frequent posting may bring too much information and burden the audience. Nonprofit managers should be cautious about what kind of information is favorable for their audience and how to find a balance between the amount and quality of the information in their day-to-day social media postings. Fourth, social media works better as a network rather than an announcer. A big number of followers may look good, but more audience may not equal more donors. Nevertheless, the network size positively affects fundraising outcomes. Starting from following others is not only more practical but also more effective than recruiting followers in building social media networks.

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Chapter 4

The Effects of Information Technology Adoption and Expenses on Donor Behavior

4.1 Abstract

Information technology benefits nonprofit organizations. However, the expenditures on technology infrastructure as part of the overhead cost may scare away donations. Do donors care about the information technology adoption and expenses in nonprofit organizations? This study investigates the donors' reactions to nonprofits' information technology budget, purposes, and performance. An online survey experiment is conducted on Qualtrics with 1,040 participants. Results show that information technology adoption performance has a positive impact on donations. Surprisingly, donors are more likely to donate to organizations with higher budgets for information technology. However, the detailed information disclosed about the purposes of IT projects negatively influences their willingness to donate. This study suggested a more open and innovative approach for nonprofits to present themselves as tech-equipped organizations to their donors.

4.2 Introduction

The first two studies of the dissertation investigated the financial benefits of information technology adoption from the organizations' perspective. In the first study of the dissertation, findings support the positive impact of IT expenditure on total donations of nonprofit organizations with 990 data. The second study confirms that a special type of information technology, social media, brings financial benefits to fundraising campaigns.

In practice, nonprofit managers generally believe that investment in information technology will bring benefits. But why? What's the behavioral mechanism behind it? Donors as key stakeholders are one of the main factors that distinguish nonprofits from the private sector. The third study aims to visit the problem from the donor's view.

Existing literature argues that good organizational performance attracts donations. Nevertheless, no studies have looked at the level of IT adoption as part of the performance. Meanwhile, a rich body of literature has discussed the negative impact of overhead costs on donations. Studies also find overhead aversions change on different types of overhead. Among them, many are experimental studies on donation behavior. However, none of the studies have investigated the impact of information technology costs as part of the overhead expenses. Thus, the purpose of this study is to test the impacts of the organizations' information technology adoption performance and spending on donation behavior.

The research question of this study is: do donors care about nonprofits' performance in information technology adoption? What are the effects of information technology expenses on donor behavior? Specifically, how does the amount of information technology expense impact donor behavior? How does the purpose of information technology expense impact donor behavior?

To answer these questions, an online survey experiment is conducted to investigate the donors' reaction to information technology adoption factors in nonprofit organizations. Using a 2 x 4 x 3 factorial design, the experiment recruited 1,040 participants on Qualtrics. The analysis examines the effects of information technology

adoption performance, IT expenditures, and purposes of the IT spending on respondents' willingness to donate.

In this essay, three hypotheses are developed from related literature, including the benefit of information technology and its potential impact on donations and fundraising, organizational performance and donations, overhead aversion, and the impact of information availability on donor behaviors. Then, the methodology is presented with the demographic characteristics of the experiment participants. The results section shows the analysis of average marginal component effects and subgroup comparisons. The last part discussed the theoretical contributions and practical implications.

4.3 Literature Review

4.3.1 Information Technology and Donations

Information technology has a tremendous impact on the nonprofit sector in modern society. McNutt, Guo, Goldkind, and An (2018) wrote a comprehensive article about the emerging information technology adopted in the nonprofit sector. They summarized the different kinds of nonprofit technology. For example, some basic types of technology that are widely used in organizations include office technology such as database management, presentation, word processing, and communication technology such as email lists. There are other technologies that help a nonprofit to manage the financial resources, outcome databases, knowledge and information system, fundraising, team building, teleconferencing, supervision, constituent relationship, case records, blogging, social networking, etc.

Among the many ways nonprofit organizations adopt information technology, donation and fundraising is a significant part that emerges new technology tools. Technology delivers massive data in a timely manner. Thus, with website-based donation systems and electronic-based fundraising, and social networking, nonprofit organizations manage fundraising and donations more effectively and efficiently (Stiver, Barroca, Minocha, Richards, & Roberts, 2015; Adler & Carpenter, 2015). Internally, donor management software collects the donors' information, segments, analyzes and communicates with current and potential donors in highly differentiated ways (Leland, 2008). Watchdog websites significantly improve the fundraising transparency for the nonprofit sector (Lee & Joseph, 2013; Dumont, 2013). For example, Guidestar and Charity Navigator provide detailed information about charities and nonprofits so that donors can authenticate the organization before they make donations. The crowdfunding platform is another emerging tool for fundraising. It broadens the potential audience for fundraising campaigns and sometimes encourages donors to participate in strategic decisions (Belleflamme, Lambert & Schweinbacher, 2010).

The benefits of information technology have been widely discussed in the existing literature. (Hackler & Saxton, 2007; Jaskyte, 2012; McNutt, Guo, Goldkind & An, 2018). In the first essay of this dissertation, the benefits of adopting information technology in nonprofit organizations are discussed and grouped into three categories, to clients, to donors, and to organizations internally and externally. The benefits of donations and individual giving, in particular, can also be analyzed in three aspects. First, directly, with information technology eliminating exclusions and enlarging the platform, nonprofits are more likely to reach a wider audience in fundraising and attract more potential donors.

Second, with technology, nonprofits deliver better service to clients in an efficient manner. Donors are in favor of better program-related outcomes for the organization. As a result, they are more likely to make donations. Third, information technology may improve administrative and operation efficiency, thus donation and fundraising have lower processing costs. In addition, information technology broadens external communication and brings collaboration opportunities with other nonprofit organizations. It exposes nonprofit organizations to the sector and offers a great potential for recruiting more donors.

Among the nonprofit technology literature, the impact of information technology adoption on organization development is generally seen as positive. In practice, nonprofit managers generally believe utilizing information technology can help with donations. However, the direct impact of information technology on the donations of nonprofit organizations is uncertain. Also, the behavioral reasons why donors respond to information technology remain unknown. Thus, further investigation is much needed.

4.3.2 Organization Performance and Donations

Similar to ordinary commodities, the donation to charity is a balance of cost and benefits (Vesterlund, 2006). There are two kinds of benefits for donors from charitable giving. The public benefit is the output produced by the relevant nonprofit organization, while the private benefit is unique to the person who contributes to the organization.

Classic economic theory (Becker, 1974) supported that, charitable donors as rational consumers are altruistic. Donors focus on the output of the organization when making the donation decision. The more donors became aware of a need for support, the

more likely they will donate. At the same time, donors care about the cost and benefit, as well as the efficacy of every dollar they give out. In the altruism theory, donors are in favor of the better performance and quality of the nonprofit organizations they give to.

Existing literature supports that organizational characteristics impacts donation behavior (Bekkers & Wiepking, 2011). Trussel and Parsons (2007) find four groups of organizational factors that are related to donations - efficiency, financial stability, information availability, and reputation. Among the many characteristics, the performance of nonprofit organizations is one of the widely discussed factors that impact donation decisions. Some empirical studies support that third-party ratings about nonprofit overall performance have a positive impact on charitable donations (Brown, Meer & Williams, 2017; Grant, 2021; Harris & Neely, 2016), especially among small nonprofits (Yoruk, 2015). However, recent studies question the impact of nonprofit performance on donations. Coupet and Schehl (2022) find that the production of nonprofit organizations does not increase donations but government grants. The unsettled impact of organizational performance on individual donations is worth further investigation.

From one perspective, information technology adoption is part of organizational performance. In modern society, information technology is an essential part of the organizational infrastructure (McNutt, Guo, Goldkind & An, 2018). Adopting information technology requires resources as it is expensive to establish, maintain, and upgrade. A higher level of information technology adoption signals the capacity of organizations and better performance of the nonprofits.

From another perspective, for nonprofit organizations, infrastructure building in information technology brings better organizational performance in multiple ways. As mentioned in the previous section, information technology in nonprofit organizations improves operational performance, innovatively delivers program services, and maximizes the impact. All of these signals may be welcomed by donors. So, from the above two perspectives, a higher level of information technology adoption will positively influence individual giving.

H4.1: Performance of information technology adoption has a positive effect on donations.

4.3.3 Overhead Aversion

Information technology is part of the infrastructure of nonprofit organizations. Depending on the purpose of information technology, the IT expenses may be seen as part of the administrative and fundraising cost. To evaluate the financial impact of information technology, it is necessary to review the existing literature about the administrative and fundraising costs in nonprofit organizations.

Same with the impact of performance on donations, overhead aversion is rooted in the altruism theory that donors care about the outcome of their donations. Overhead aversion is consistently supported in nonprofit studies over years (Callen, 1994; Gordon, Knock & Nealy, 2009; Jacobs & Marudas, 2009; Khanna, Posnett & Sandler, 1995; Marudas, 2004; Tinkelman, 1998; Tinkelman & Mankaney, 2007; Yan & Sloan, 2016). Later research also discussed that when the overhead cost is covered by other revenue

sources, whether donors are less or still averted by overhead costs associated with fundraising and administration (Gneezy et al., 2014; Charles, Sloan & Schubert, 2020).

Though overhead cost is vital to the operational capacity of nonprofits, the public believes that low overhead is better than high overhead in nonprofit management. Thus in practice, nonprofit organizations usually minimize their cost in general management and fundraising in order to attract funders and donors. The underreporting incentivized by the lower managerial expenditures is also found in fundraising expenses (Krishnan, Yetman & Yetman, 2006). However, nonprofit starvation cycle literature finds that reducing overhead costs may negatively impact the effectiveness of the nonprofit organizations thus extent the negative impact on mission-related activities (Gregory & Howard, 2009; Lecy & Searing, 2015; Wing & Hager, 2004).

A common limitation of the overhead literature is the assumption that donors have complete information regarding a nonprofit's financial activities. Steinberg (1986) argues that the price of giving is independent of expenditure ratios because donors will not know all the relevant parameters when making donation decisions. In response, a robust body of experimental studies is conducted further to investigate donors' reactions to the expense information. Overhead aversion is confirmed in some studies (Qu & Daniel, 2019), while other studies find devoted donors are less swayed by overhead costs (Newman, Shniderman, Cain & Sevel, 2019). Some studies also find that donors care about the fundraising cost (Khumawala, Parsons & Gordon, 2005) or program spending ratio (Buchheit & Parsons, 2006) the most on the financial statement.

Among the many overhead studies, some touched on the different types of overhead matters for donations (Portillo & Stinn, 2018), but few, if not none, have been

investigating the information technology expenses as part of it. The first essay of this dissertation is among the earliest to discuss this issue. To fulfill the limitation of the above-mentioned overhead assumption, an experimental study investigating the donors' reaction to information technology expenditures may further explain the mechanisms behind why information technology influences donations.

H4.2: IT expenses have a negative impact on donation behavior

4.3.4 Information Availability and Donations

Nonprofit literature has been discussing the harm of information asymmetry in nonprofit management. Information asymmetry often discourages individuals' donations to nonprofit organizations. Effective communication strategies play an important role in attracting targeted donors (Li, 2017). Existing research has discussed the impact of various types of information on donors' giving decisions. Financial-related information and performance-related information are the main part of nonprofit information disclosure. The effects on donations are mixed. Some literature found that donors are more likely to respond to financial information than to performance-related information (Saxton, Neely & Guo, 2014), while others see performance-related information as more influential (McDowell, Li & Smith, 2013).

Transparency and information availability has been proven to be positive factors in fundraising and voluntary donations. A confirmed finding from existing studies is that the availability of accounting information has a positive impact on individual donations (Parsons, 2003). Accessible financial information is one of the factors that capture good governance (Harris, Petrovits & Yetman, 2014). The potential donors take financial

information, especially the program expenditure ratio, as a useful part of the donation process (Khumawala & Gordon, 1997). Fundraising requests containing service efforts and accomplishment disclosures are more informative than typical fundraising pleas, attracting more individual donations (Buchheit & Parsons, 2006). Certain individuals are more likely to make a charitable donation when they receive favorable financial information as part of their fundraising request (Parsons, 2007).

In IRS annual tax filing Form 990, information technology expenses (Part IX, line 14), as part of the functional expenditure, include three sub-categories - program service expenses, management and general expenses, and fundraising expenses. Following the same categorization, the purposes of information technology projects are grouped into three categories, program service-related, management-related, and fundraising-related. The detailed information technology expenditure is part of the accounting information. Disclosing the purposes of the information technology expenditures is a signal of transparency, which will be welcomed by donors.

H4.3: Detailed information disclosure of IT expenditures purposes has a positive impact on donations

4.4 Methodology

As discussed in the literature review section, previous literature explains the interaction between expenses and revenues with microeconomic theory. A common limitation of this literature is the assumption that donors have full information regarding a nonprofit's financial activities.

However, in the real world, detailed financial information of nonprofit organizations is not available to donors. Alternatively, even available, donors may not be aware or care about it when they make donation decisions. Thus, it's not easy to evaluate the direct impact of expenses, including information technology costs, on donation behaviors.

Signaling theory (Connelly, Certo, Ireland & Reutzel, 2011) serves as the theoretical foundation of the research design. Signal receivers are influenced by the formal or informal signals diffused from the signal senders. In charitable giving, donors as signal receivers look for signals about the organization in the information disclosed and evaluate the need and potential output and outcome of their donations. On one hand, the higher level of information technology adoption is a signal of better organizational performance and accountability that may affect donor trust in order to give. On the other hand, a higher expense in information technology signals a higher overhead cost, which may scare away donations. Also, the donors may interpret the types of information technology expenditure as a signal of the different priorities of the nonprofit organization. Understanding the donors' reaction to the three attributes of information technology adoption will explain the behavioral mechanism behind the financial returns of information technology investments.

To test the direct impact of information technology-related information on donation behaviors, the study used the survey experiment method. Survey experiment is widely used in public and nonprofit research. Using experiment to test donation behaviors are confirmed to be valid (Benz, 2008). In recent years, an increasing number of studies apply an experimental approach to examine the causality between nonprofit

spending and charitable contributions (Charles et al., 2020; Gneezy et al., 2014; Newman et al., 2019; Portillo & Stinn, 2018; Ryazanov & Christenfeld, 2018).

A randomized survey experiment is conducted online. The survey is distributed through Rutgers University - Newark SPAA Omnibus program sponsored by the Center for Experimental and Behavioral Public Administration (CEBPA). The Omnibus survey contains eight studies in total, among which this study is one of them. All eight studies are assigned to respondents in random order. Survey invitations were distributed by Qualtrics through its network of actively managed, double-opt-in market research panels between April 8 and April 23, 2021. One thousand forty participants with nationally representative quotas by region, gender, age, and race/ethnicity (US Census Bureau, 2019) are recruited after checking for bots, duplicates, speeders, and fraudulent responses. Additional information including education level, income level, employment, and the number of children is collected. Also, the participants are asked about how much money they have given to a charity and how much volunteer work they have done for charities during the past 12 months. The demographic distributions of the respondents are presented in Table 4.1.

Among the nationally representative samples of gender, race/ethnicity, and region, most of the respondents have some college and higher education levels. The median household income level is $50,000 to $75,000. Almost half of the respondents are not employed. Among the employed ones, around half work for for-profit companies and businesses. Most of them do not have children in the household. Regarding the donor and volunteer status, over 70% of the respondents identify themselves as donors, while more than 50% self-identify as volunteers.

Table 4.1. Demographic Characteristics of the Participants

Demographic Statistics	**Obs**	**%**
Total Respondents	1040	
Gender		
Male	512	49.23%
Female	528	50.77%
Race/Ethnicity		
White	647	62.21%
Black/African American	130	12.50%
Hispanic/Latino	178	17.12%
Asian	57	5.48%
Other	28	2.69%
Age		
18 - 24	139	13.37%
25 - 34	169	16.25%
35 - 44	227	21.83%
45 - 54	135	12.98%
55 - 64	107	10.29%
65 - 74	184	17.69%
75 - 84	79	7.60%
Region		
Northeast	190	18.27%
Midwest	222	21.35%
West	245	23.56%
South	383	36.83%
Education		
Less than High School	13	1.25%
High School / GED	201	19.33%

Some College	192	18.46%
2-year College Degree	103	9.90%
4-year College Degree	284	27.31%
Masters Degree	183	17.60%
Doctoral Degree	29	2.79%
Professional Degree (JD, MD)	32	3.08%
Other	3	0.29%
Income		
Less than $25,000	191	18.37%
$25,000 to $34,999	132	12.69%
$35,000 to $49,999	120	11.54%
$50,000 to $74,999	171	16.44%
$75,000 to $99,999	143	13.75%
$100,000 to $149,999	177	17.02%
$150,000 to $199,999	66	6.35%
$200,000 or more	40	3.85%
Employment		
Not employed (retired, disabled, student)	490	47.12%
Government	91	8.75%
Non-profit organization	53	5.10%
For-profit company or business	268	25.77%
Other (Self-employed, Family business, etc.)	138	13.27%
Number of children		
None	645	62.02%
One	122	11.73%
Two	170	16.35%
Three or more	94	9.04%
Donation		
A lot	138	13.27%
Some	408	39.23%
Only a little	251	24.13%
None at all	243	23.37%

Volunteer		
A lot	121	11.63%
Some	235	22.60%
Only a little	191	18.37%
None at all	493	47.40%

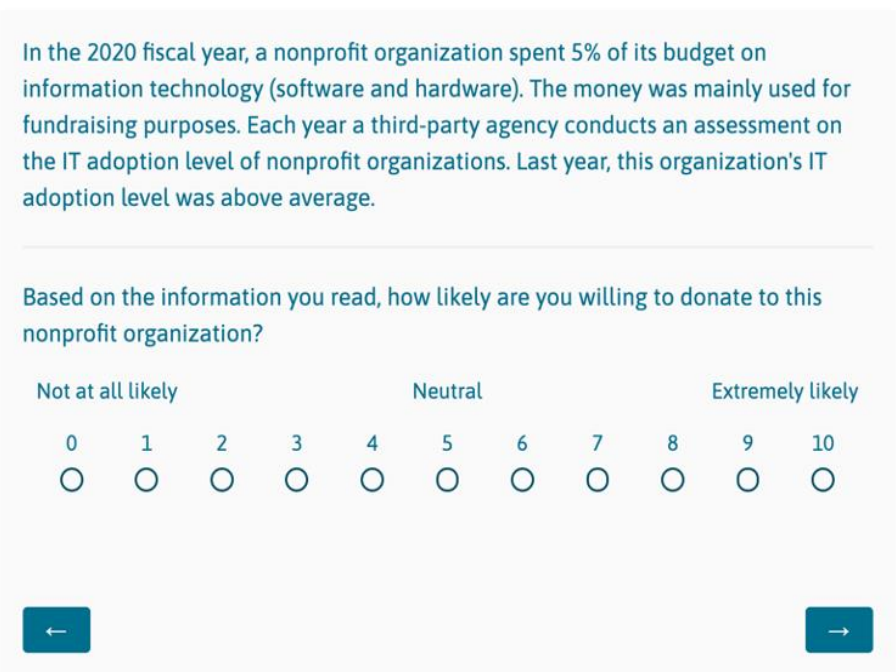
The experiment uses a 2 x 4 x 3 factorial design, as shown in Table 2. The three attributes include the amount of IT expenses, the purposes of IT expenses, and the level of IT adoption. The first treatment, expense amount, is to test the hypothesis that the higher expenditures in IT have a negative impact on donations. The two levels are less than 1% and 5% of the total expenses. The third treatment is designed to test the third hypothesis - detailed information disclosure of IT expenditures has a negative effect on donations. The purposes of expenses are manipulated on four levels, including no information (baseline), management purposes, fundraising purposes, and program service purposes. The third treatment is the levels of IT adoption, which test the hypothesis about the positive effect of performance in information technology adoption on donations. Third-party ratings on performance is manipulated. The three levels of IT adoption are randomly assigned as average (baseline), below average, and above average.

Table 4.2. 2 x 4 x 3 Factorial Design

Treatment 1: IT Expenses	● <1% (baseline) ● 5%
Treatment 2: Purposes of IT Cost	● No information (baseline) ● Management ● Fundraising ● Program Service
Treatment 3: IT Adoption Level	● Below average ● Average (baseline) ● Above average

Figure 4.1 shows a sample of the questionnaire. First, one of the 24 vignettes includes a statement about a nonprofit information technology adoption is randomly assigned to the participants. “In the 2020 fiscal year, a nonprofit organization spent [‘less than 1%’ / ‘5%’] of its budget on information technology (software and hardware). The IT budget was mainly spent for [no information / ‘fundraising purposes’ / ‘program service purposes’ / ‘management purposes’]. Each year, a third-party agency conducts an assessment on the IT adoption level of nonprofit organizations. Last year, this organization’s IT adoption level was [‘below average’ / ‘average’ / ‘above average’].” After reading the statement, the participants use a 0-10 scale to evaluate their likelihood of donation.

Figure 4.1. Sample Questionnaire



Average marginal component effect (AMCE) Analysis is used to evaluate the impact of each randomized treatment on donations. AMCE represents the marginal effect of a particular attribute while averaging over the remaining attributes in the regression model. In this study, it measures the average causal effect of each attribute on donation behavior. The dependent variable is the donor's willingness to donate. The independent variables are the percentage of IT expenses, the purpose of IT expenses, and the IT adoption level. Results are also compared within demographic subgroups based on gender, age, race-ethnicity, education level, income level, employer sector, volunteer status, and donor status, to see the difference in the effects.

4.5 Results

4.5.1 Average Marginal Component Effects

Figure 4.2 and Table 4.3 show the results of the AMCE analysis. Generally speaking, the amount of IT expenditure has a positive impact on donations. Detailed information disclosed about IT purposes has a negative impact on donations. The performance of IT adoption has a positive impact on donation behavior.

Figure 4.2. Results of Average Marginal Component Effect Analysis

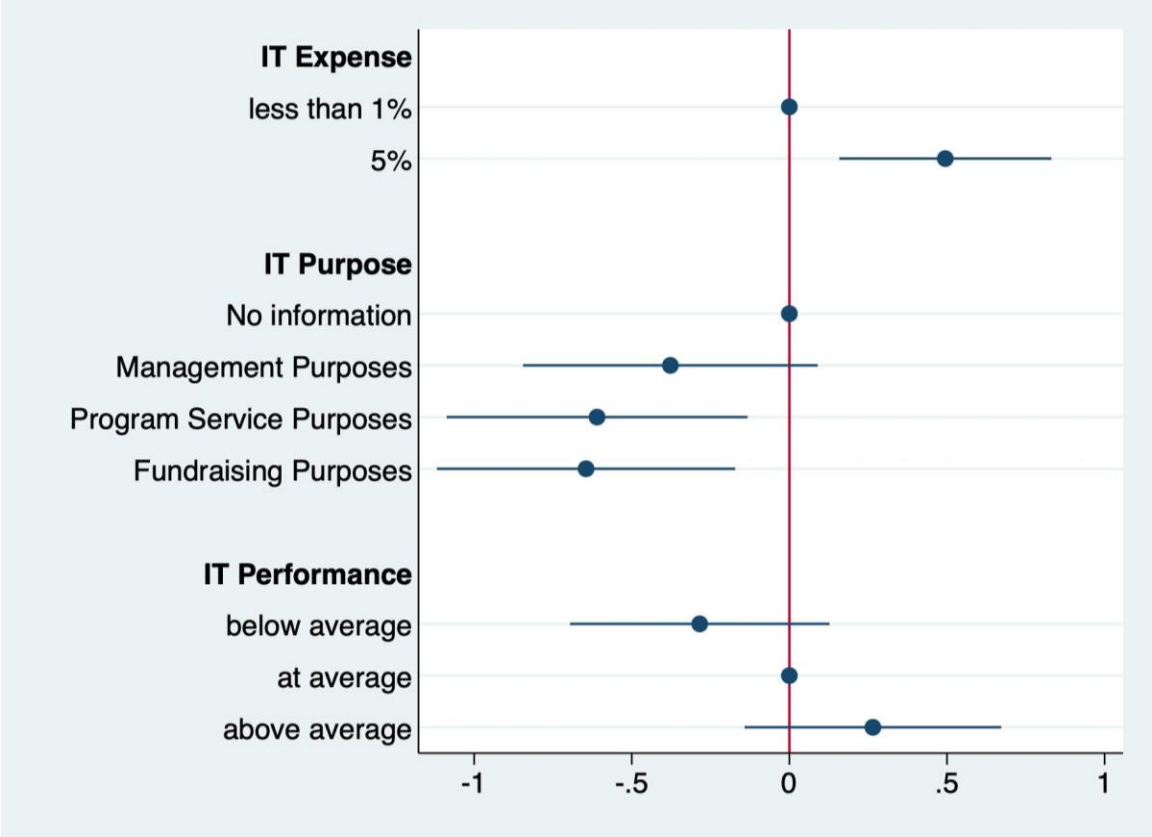


Table 4.3. Statistical Results of Average Marginal Component Analysis

	DV: Donation Willingness
IT Expense (Baseline: Less than 1% of total budget)	
5% of total budget	0.495***
	(0.171)
IT Purpose (Baseline: No information)	
Management purposes	-0.378
	(0.238)
Program service purposes	-0.610**
	(0.243)
Fundraising purposes	-0.645***

	(0.241)
IT Performance (Baseline: At average)	
Below average	-0.284
	(0.210)
Above average	0.265
	(0.207)
_cons	5.419
Obs	1,035
R-squared	0.0232
*p<0.1; **p<0.05; ***p<0.01	

First, for the percentage of total budget spent on IT, when people see the organization spend 5% of its budget on IT, they are more likely to donate than those who see less than 1% of the total budget spent on IT. Their willingness to donation increase by almost 0.5 on a 0-10 scale. The coefficient is statistically significant at the 0.01 level. This result rejected the second hypothesis, IT expenses do not have a negative impact on donations. Instead, within a reasonable range, the higher spending on IT, the more likely donors will donate.

Second, for the purpose of IT projects, the study hypothesizes that donors are in favor of information disclosure about where the organization spends its IT budget on. The rationale behind this hypothesis is that organizational transparency is welcomed. Surprisingly, the results show opposite findings and reject the third hypothesis. Detailed information disclosure of IT expenditure purposes has a negative impact on donations. Especially, donors do not like spending money on program service-related IT projects

and IT budget for fundraising purposes. Compare to no information being given, people's willingness to donate decreases by 0.645 on a 0-10 scale when they see the organization spent its IT budget on fundraising purposes. Though the nonprofit literature believes that donors like to see their donations spent on mission-related program services, when the organization spent the IT budget for program service purposes, they are still less likely to donate. The donation willingness is 0.61 less than no information being disclosed on a 0-10 scale.

Third, how does the IT adoption performance impact donation willingness? This result is not surprising. Performance rating in IT adoption has a positive impact on donations, though the result is not statistically significant.

The results of the AMCE analysis find a positive impact of performance in information technology adoption on donations. IT expenses aversion is only found when detailed spending type of IT cost is disclosed. Donors dislike organizations that spend IT budgets on program services the most. However, the percentage of IT expenditures has a positive impact on donations.

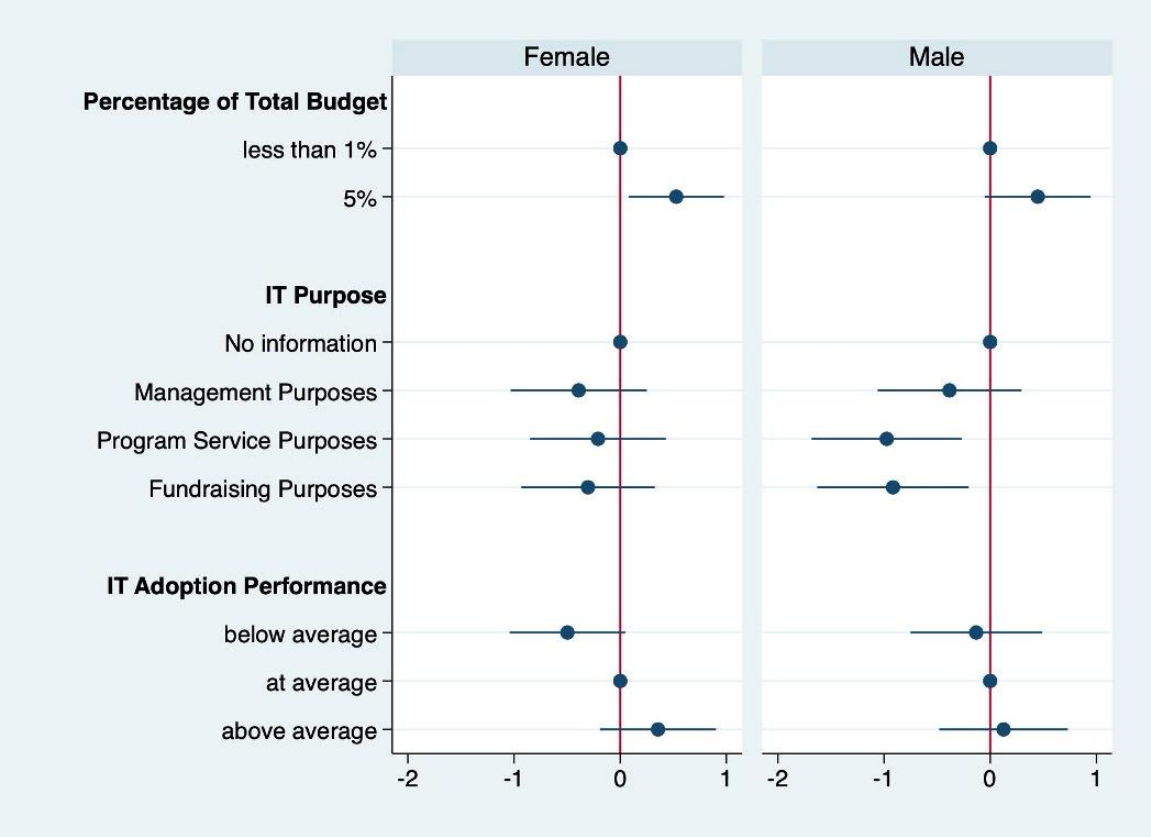
4.5.2 Subgroup Comparison

With the demographic information collected from the survey, subgroup comparison is analyzed based on gender, race, age, education, income, employment, donor and volunteer status. Figures 4.3 to 4.11 show the results of the subgroup comparison.

In different gender groups (Figure 4.3), males are more sensitive to the information disclosed about information technology purposes than females, while

females are more sensitive to the IT adoption performance. In particular, males are less likely to donate when they see the nonprofit organization allocate IT budget for program service purposes and fundraising purposes. The negative correlation is statistically significant. Also, the impact of IT expenditures on donations is slightly more significant among females than males.

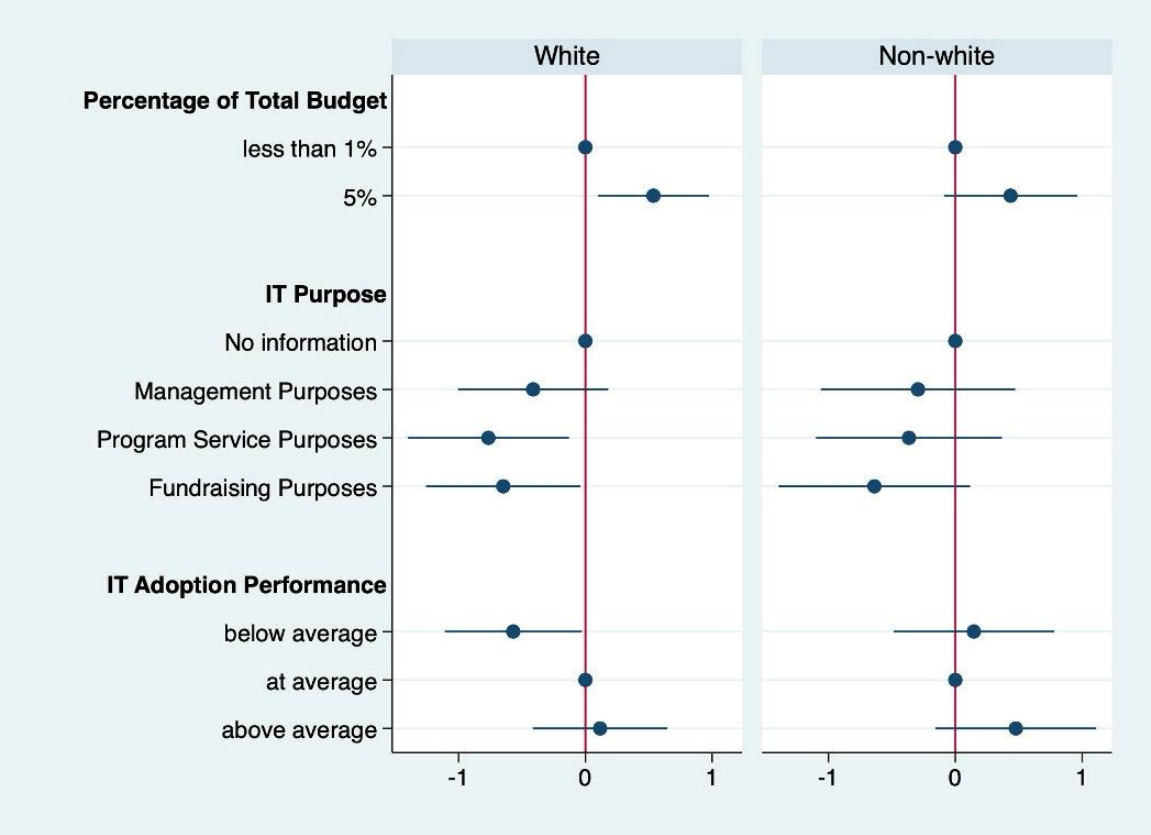
Figure 4.3. Subgroup Comparison Female vs. Male



Among the race subgroups (Figure 4.4), the positive impact of IT budget amount on donation decisions is more significant among white than non-white respondents. When white respondents see the organization's IT adoption performance is below average, their willingness to donate to the organization decrease by around 0.5 on a 0-10 scale. The negative impact is statistically significant. Non-white respondents care less

about the IT adoption performance. The negative impacts of disclosing IT purposes on donors are only significant among white participants.

Figure 4.4. Subgroup Comparison White vs. Non-white

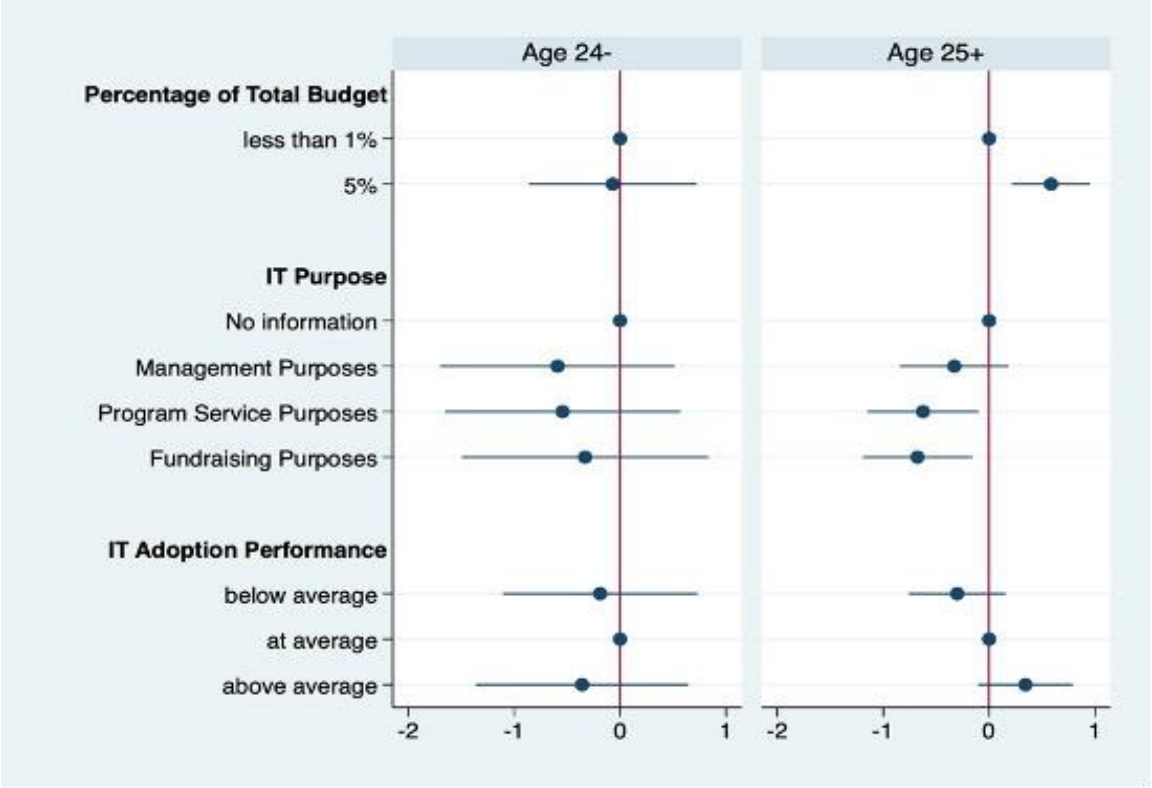


Information technology is believed to be more welcomed by younger people in common sense. The younger generation utilizes all kinds of technology in their daily lives more often. They may agree with the nonprofit organizations to input more in information technology. Thus, a subgroup comparison is done among different age groups (Figure 4.5). Surprisingly, younger respondents are less sensitive than older respondents regarding the IT budget, IT purposes, and IT performance. Among the age group of 24 and younger, all information about information technology has negative impact on donations, though the correlation between the treatment and behaviors are not

significant statistically. The positive influence of IT budget and IT performance, as well as the negative impact of IT purposes disclosure, are only observed in older 25+ age groups.

A potential explanation for this surprising finding may lies in the limited knowledge of organizational management and resource allocation in young people. Some of them may have limited working experience and may link information technology more to entertainment rather than production and profitability.

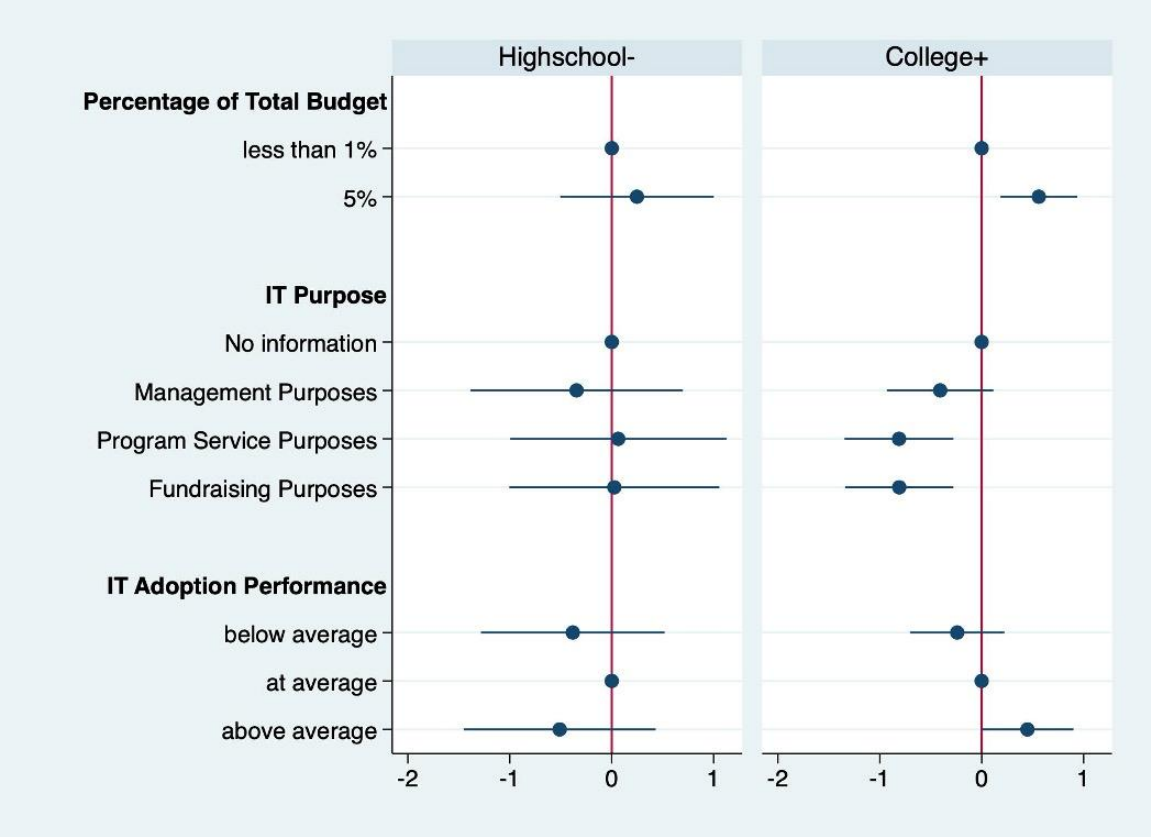
Figure 4.5. Subgroup Comparison Age 24 and younger vs. Age 25 and older



The utilization of information technology requires knowledge and education. A comparison is done among people with different education levels (Figure 4.6). Consistent results are found among people with a somewhat college education or higher, while the

impact of information technology on donations is not significant among people with a high school education or lower. This educational level subgroup comparison also explains the surprising negative impact of information technology on donations among people under 24 years of age.

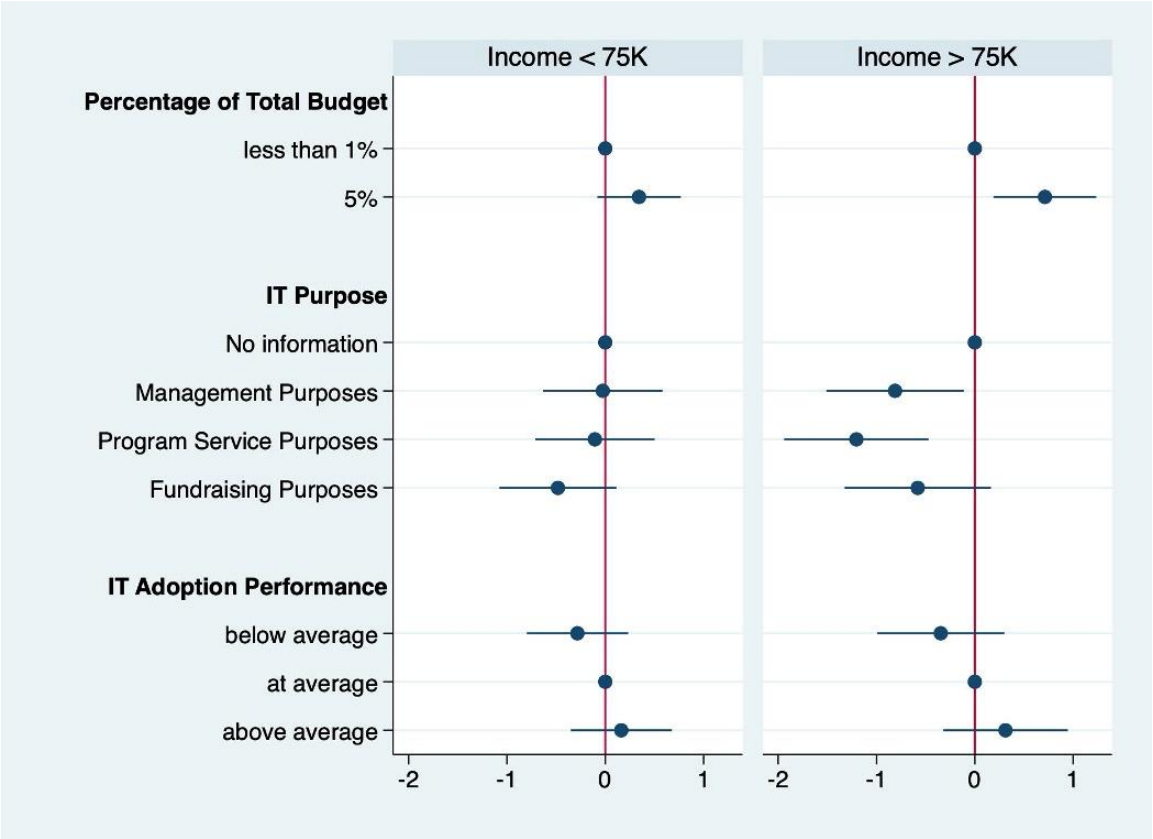
Figure 4.6. Subgroup Comparison Highschool and Lower vs. Somewhat College and Higher



Income level also makes a slight difference in the respondents' reactions to information technology adoption in nonprofits. Figure 4.7 show that people with different income level respond similarly about their willingness to donate regarding the IT amount and performance rating. However, the subgroup with a household income higher than $75,000 is more sensitive to the information disclosed about the purposes of the IT

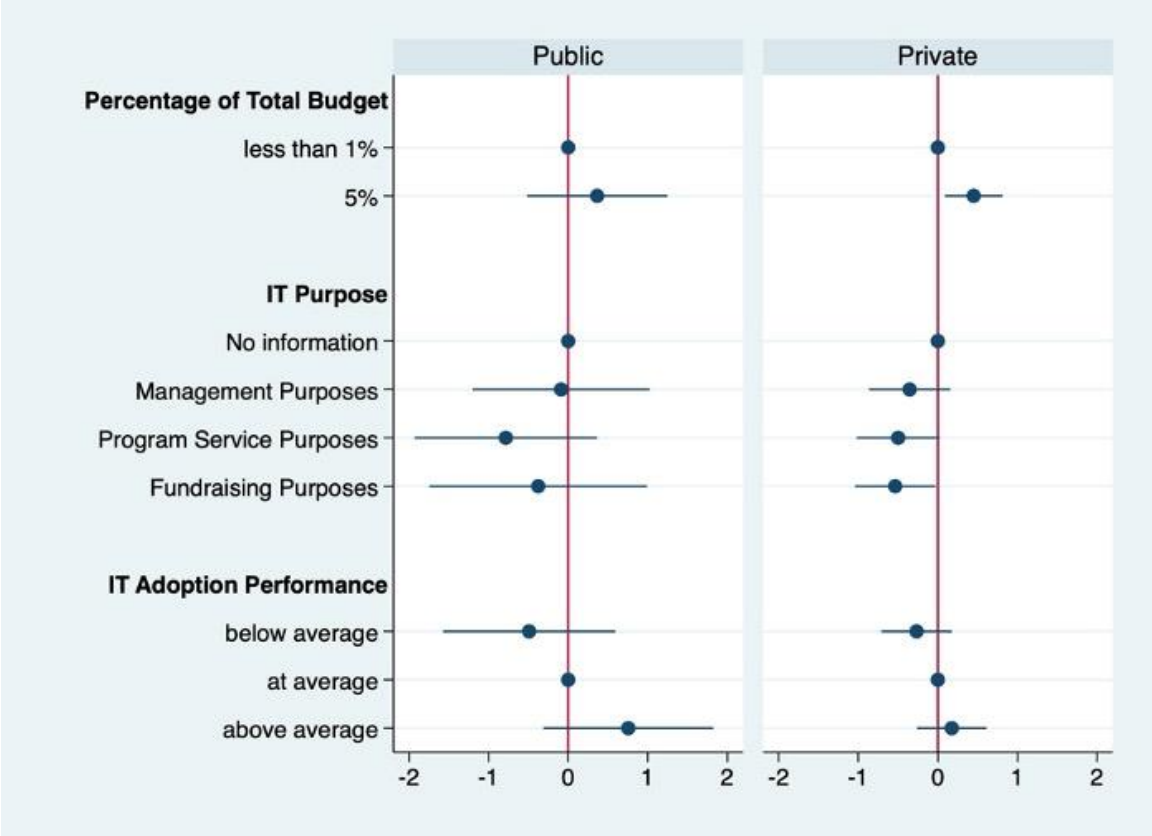
budget. They are significantly less likely to donate when the organization spends its IT budget on program service and management.

Figure 4.7. Subgroup Comparison Household Income $75,000 and Lower vs. $75,000 and Higher



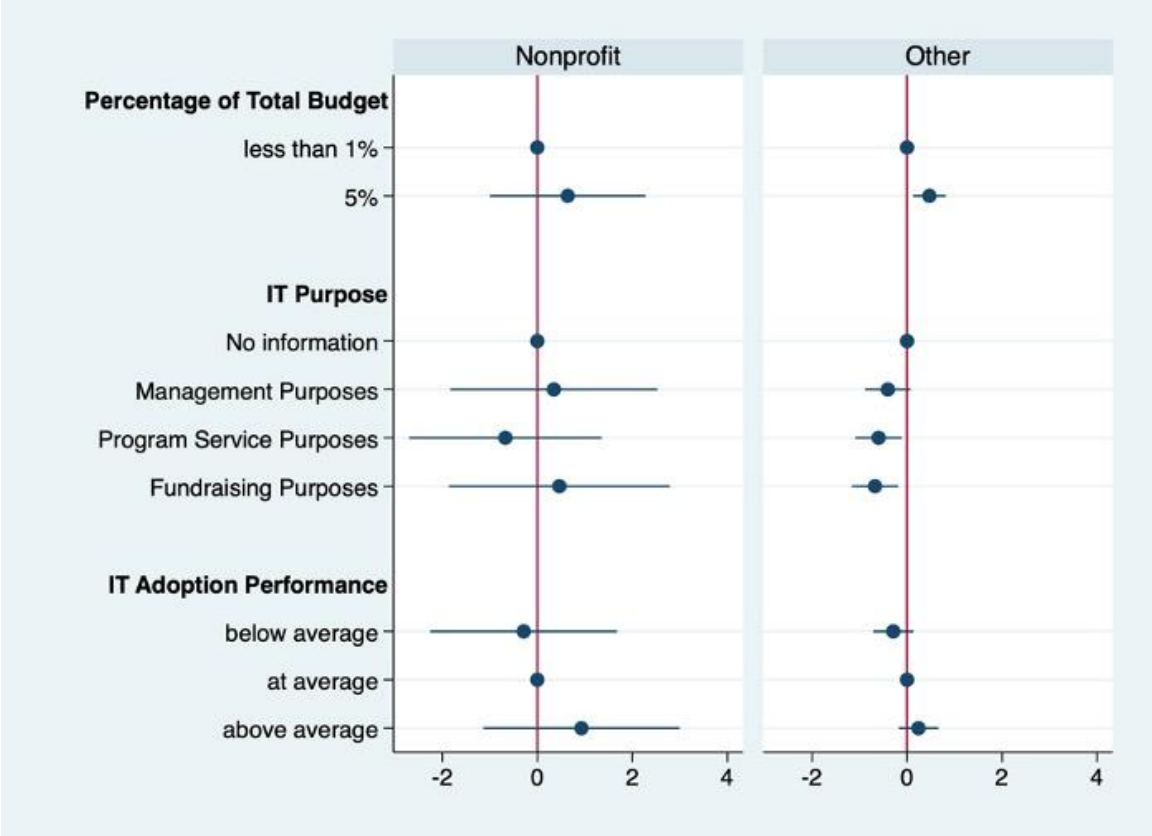
Occupation of the donors may influence their understanding of information technology and their donation behavior. This study compared people who work in the public sector to the private sector employees. The same pattern is found in the private sector group. In this group, IT budget and IT performance positively impact donation willingness while the detailed purposes of IT scare away individual giving. However, for public sector employees, none of the treatment about IT adoption in nonprofits significantly influenced their donation behavior.

Figure 4.8. Subgroup Comparison Public Sector Employees vs. Private Sector Employees



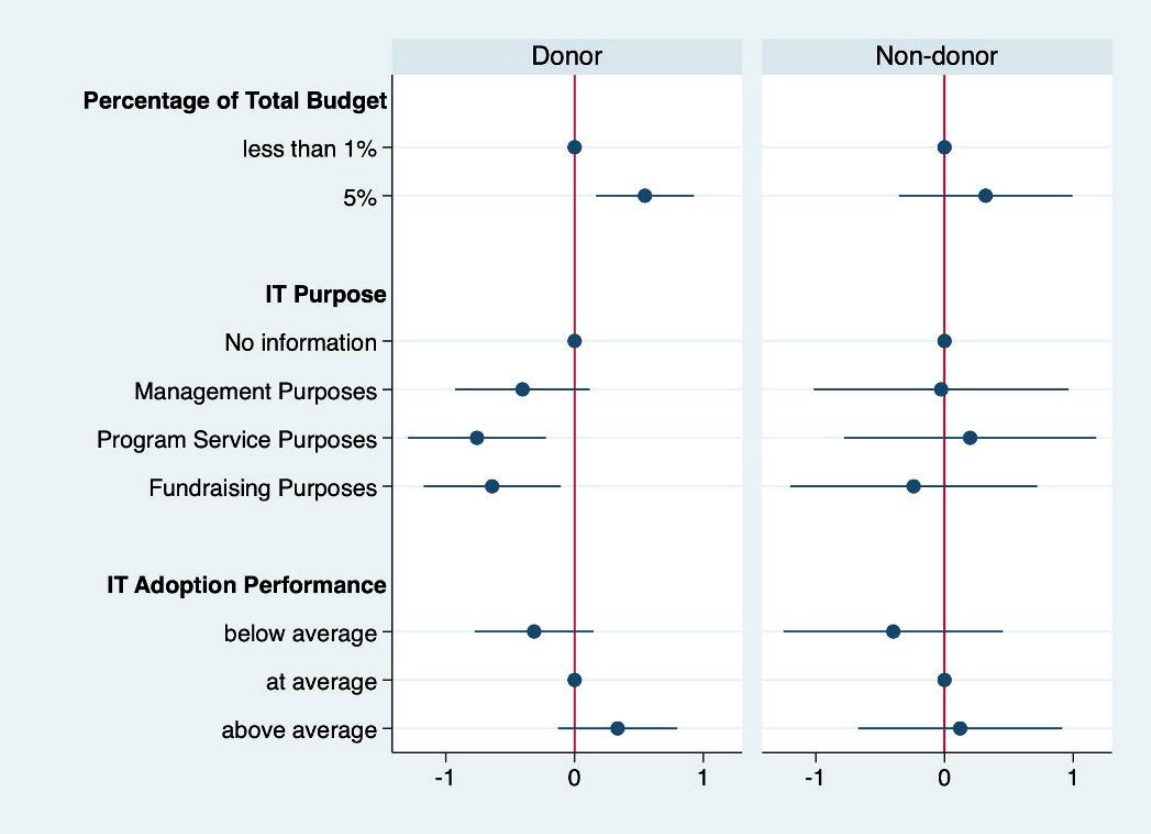
A closer investigation is done for nonprofit sector employees and others. The impact of IT budget and IT performance on donation willingness follows the same pattern among public employees and nonprofit employees. Both of the two factors positively influence the donation, but the correlation is not statistically significant. Interestingly, regarding IT purposes, nonprofit employees are more likely to donate when the IT budget are spent in management and fundraising, though not significant. It may reveal the pain of overhead aversion that nonprofit employees experience in their work so that they are more likely to support overhead cost in their personal donation decisions.

Figure 4.9. Subgroup Comparison Nonprofit Sector Employees vs. Other Respondents



The occupational subgroup comparisons suggest that people's existing knowledge about information technology and nonprofit organizations may influence their respondence. Thus, the same model is tested among donors and volunteers who are more engaged in the nonprofit sector. Among respondents that have never donated money to any charities in the past 12 months, the information technology adoption factors do not have a significant impact on their donation behaviors. It is possible that people who never give to nonprofit organizations naturally have little willingness to donate no matter what the organization is and how the organization is managed. In contrast, people who identify themselves as donors care more about the organizational factors and thus make more rational donation decisions than non-donors.

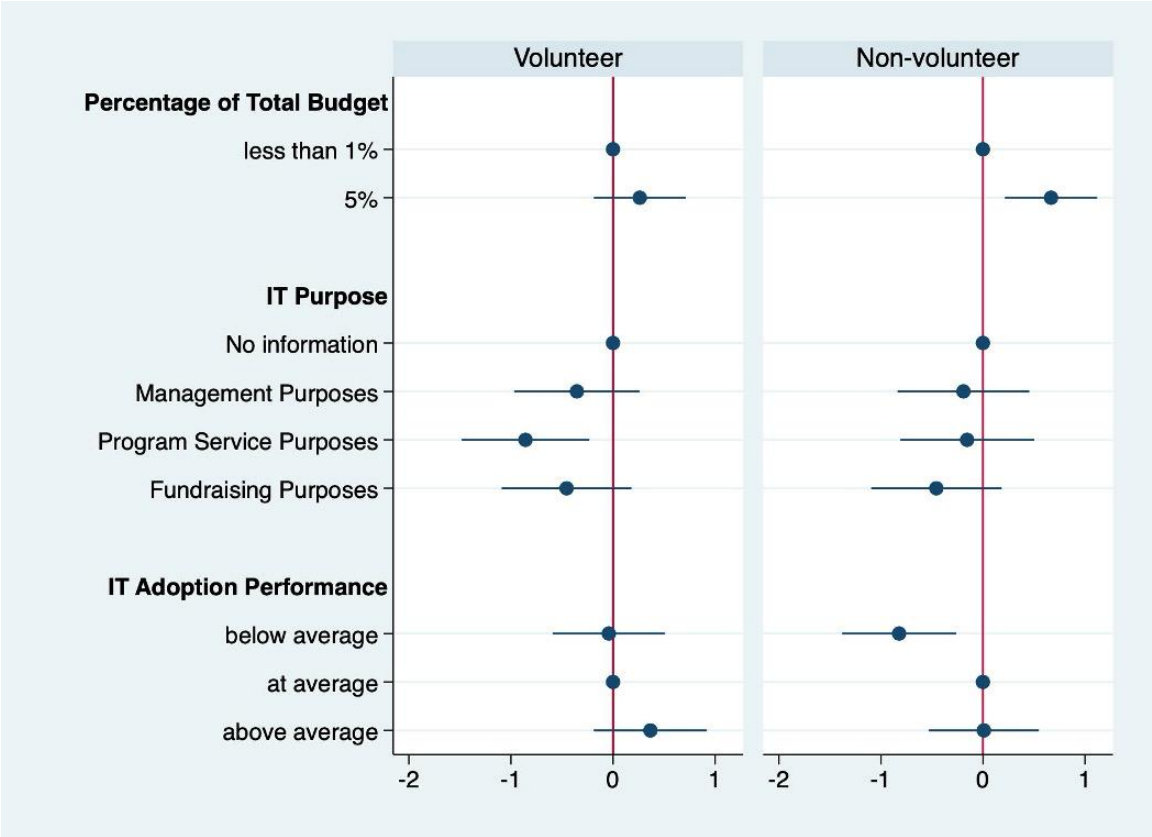
Figure 4.10. Subgroup Comparison Donors vs. Non-donors



Among the people who did volunteer work with charitable organizations, IT budget and IT performance have a less significant influence on their donation behavior. These results follow a similar pattern of the non-significant impacts among public and nonprofit employees. Among volunteers, as well as public and nonprofit employees, IT budget and IT performance do not significantly influence giving. A possible reason is that, with more insider information, these groups of respondents have too many weeds in their minds about the organizational factors and charitable giving. As a result, the treatments of IT adoption factors have mixed influences on their donation decisions. Comparing volunteers to non-volunteers, the negative impact of spending IT on program service purposes is stronger among volunteers. Interestingly, the negative impact of below-average IT adoption performance on donation willingness is much stronger among

non-volunteers, while the above-average performance does not encourage the willingness to donate.

Figure 4.11. Subgroup Comparison Volunteers vs. Non-volunteers



4.6 Conclusion and Implications

To sum up, this study applies a survey experiment to test the effects of information technology adoption and expenses on donors' willingness to contribute. Findings confirm that donors care about the nonprofit organizations' information technology adoption. First, performance in information technology positively influences donations. The better the performance, the more likely people are willing to donate. However, opposite to the hypotheses, expenditures on information technology have a

positive impact on respondents' donation willingness. Third, detailed information disclosure of IT expenditures purposes has a negative impact on donations. Among the three types of purposes, spending information technology for purposes related to fundraising and program service decreases donors' willingness to donate the most.

Subgroup comparisons suggest that these findings may not apply to donors with certain demographic characteristics. For instance, the impact of IT expenses amount on donations is not observed among young donors, people with no college education, public and nonprofit employees. Minorities, younger generations, and lower educated respondents do not care about the performance of the nonprofit organizations' IT adoption when making donation decisions. For the purposes of IT projects, it has a negative impact on donations from male, white, older age groups, better-educated people, and participants with higher income. Nonprofit insiders such as public and nonprofit employees are not influenced by the information availability about IT budget purposes, while contributors like donor and volunteers are more sensitive about where the IT budgets are spent on.

The study makes theoretical contributions and joins the conversation with existing nonprofit literature. First, the study confirms that performance matters for donations. The IT adoption level reveals part of the performance of the organizations and it positively impacts donations. It supports the argument that third-party ratings and performance-related information positively impact donations.

Second, it joins the active discussion about overhead aversion in nonprofit literature. Though previous literature suggests that a higher proportion of overhead costs decreases charitable donations. However, the percentage of IT expenditures has a positive

impact on donations. This study supports the argument that different types of overhead have different effects on donations. The findings imply that IT cost is different from other overhead costs. It should not be simply seen as part of the expense for infrastructure. One potential explanation is, that people may have expectations about adopting IT to save money on administration. It can serve as an investment in infrastructure. Thus, IT investment should not be neglected in nonprofit literature and further research is much needed. For example, the treatment of the IT budget is set as less than 1% and 5% in the experiment design. There is a significant increase in donation willingness when 5% is disclosed. But future studies may look for a turning point with the "IT aversion".

Third, though previous literature believes that information asymmetry is harmful to donations, the new findings suggest that information disclosure and transparency may not always be a good thing. In this study, donors are happy to see information about spending on IT and third-party ratings. However, they are scared away by information about the purpose of IT spending in nonprofits. Nonprofits need to be careful about how to communicate the right information with donors to receive their support on IT projects, or more broadly speaking, support management, fundraising, and program expenses.

The study also offers some management implications for nonprofit practitioners. With limited resources, nonprofit managers may minimize the input in technology. In addition, with concerns about overhead aversion, nonprofit organizations may manipulate the reporting of their expense on information technology. However, this study suggests a more open and innovative approach. Donors are willing to see a higher level of information technology adoption in nonprofit organizations. They are in favor of tech-equipped nonprofits. Donors see information technology adoption as a positive sign of

organizational capacity and performance. Thus, they are more generous to support the cost. Nevertheless, nonprofit organizations need to be careful about disclosing the detailed purposes of information technology projects.

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Chapter 5

Conclusion

The overall research question of the dissertation is, can information technology costs in nonprofit organizations be paid off? What are the financial benefits of information technology adoption in nonprofit organizations? The research questions of the three studies investigate the overall research question from different perspectives. The first study asks about the financial returns on information technology investments by measuring the revenues and efficiency in all kinds of organizations across the nonprofit sector. The second study raises the research question about how social media engagement directly impacts fundraising campaign performance for small nonprofit organizations. The third study answers how the donors react to information technology adoption by examining their willingness to donate influenced by adoption costs, purposes, and performance.

A short answer to the research questions is - worth it! All three studies in this dissertation find evidence of the financial benefits of information technology adoption in nonprofit organizations. In Chapter 2, the findings from the panel analysis with 990 data support that expenditure on information technology generates higher total revenue, charitable donations, and program service income. It also improves management efficiency, though not fundraising efficiency and program service efficiency. The study about the social media fundraising campaign in Chapter 3 finds that social media engagement has an ongoing impact on fundraising outcomes. The total number of likes received on Twitter positively impacts the amount of charitable giving received in the

fundraising campaign. The network size of the organizational Twitter account has a long-term impact on fundraising performance. The survey experiment in Chapter 4 confirms that donors are willing to donate to nonprofit organizations that better adopt information technology. One highlight from the findings is that overhead aversion does not apply to information technology costs. Donors are more likely to donate to nonprofit organizations that have higher spending on information technology within a reasonable range.

The empirical findings in the three studies support each other and provide potential explanations for each other. For example, the 990 longitudinal study finds that information technology expenditures can positively impact the total donations received in the following year. The second study confirms that active engagement on social media, as part of the information technology input, improves fundraising campaign outcomes, as part of the total donations. The third study explains the behavioral mechanism behind the positive correlation between information technology and donations in the first two studies. Donors are more likely to donate when they see the organization invests more and performs better in adopting information technology. All findings support the suggestion that information technology should not be simply seen as part of the overhead cost, but as an investment for infrastructure.

As discussed in each chapter, the three studies are not without limitation. However, the three studies applied multiple methodologies to strengthen the robustness and broaden the scope of the dissertation as a whole. For example, the sample of the first study only includes nonprofit organizations that report their information technology expenditures in the tax forms, thus small nonprofit organizations and low-cost information technology are not within the scope of this research design. In response to

this limitation, the second study took a closer look into social media as a low-cost, if not a zero-cost type of information technology. It also focuses on the small nonprofit organizations that are overlooked in previous literature while suffering most from the deficit of resources. Also, self-reporting data accuracy is widely questioned in nonprofit studies using secondary 990 tax data. The second and third studies collect data using computational social science methods and survey experiments to conduct the research in supplement to the 990-accuracy limitation. In addition, the financial benefits of adopting information technology are seen from both the organization's perspective in the first two studies and the donors' perspective in the third study. The overall research question is examined more thoroughly by combining organizational level study and individual level analysis.

The dissertation makes theoretical contributions in multiple ways. First, it is among the trend of increasing research in all kinds of information technology adoption and innovation in the nonprofit sector. Especially in the post-pandemic era, with the shortage of staff, increasing remote work, and the trend of digital communication in future online everyday life, information technology is an unavoidable future of the nonprofit sector. The study fills the gaps in measuring and evaluating the benefits of information technology for nonprofit organizations. For example, the first study measures the output of information technology investment with revenues and efficiency. The second study evaluates the direct financial impact of social media investment by investigating the fundraising campaign amount. Second, the dissertation joins the conversation among the nonprofit overhead literature by taking a more detailed look and seeing information technology as a special type of overhead cost. The dissertation

suggests that administrative costs may not always be seen as a burden to nonprofit organizations. The spending on information technology can bring financial returns, thus it should be seen as an investment in infrastructure rather than an administrative burden. Third, the dissertation includes nonprofit organizations across literature in multiple disciplines. For example, the first study brings nonprofit organizations into the scope of the literature in information system management researching the productivity of information technology. The social media study adds to the communication theory about utilizing social media to lift communication barriers that the quality of the information communicated matters more than the quantity of it. The survey experiment also challenges existing literature about the negative impact of information asymmetry and suggests communicating the right information instead of absolute transparency.

The dissertation offers many management implications and practical takeaways for nonprofit organizations of all types. The 990 study in Chapter 2 includes all types of nonprofit organizations in terms of subfield and size. The social media study focuses on small nonprofits, while the survey experiment provides suggestions to nonprofits that rely more on charitable donations. A key suggestion the dissertation provides to the nonprofit sector is that information technology expenditure is worth the money. The information technology cost should be treated as an investment in infrastructure, thus requiring strategic allocation. Presenting as a technology-equipped nonprofit will attract donations, instead of scaring away donors, thus the organizations should be more confident in adopting information technology. The dissertation encourages nonprofit organizations that lack resources to try low-cost technology, for example, social media is an easy-to-start technology as it brings immediate returns in fundraising campaigns. While actively

adopting information technology is suggested, this dissertation also reminds nonprofit managers about being careful in delivering information with the help of technology. Though technology will significantly increase the amount of information in external communication, it is still essential to disclose information selectively as the quality of information matters.

The dissertation is one of the early studies focused on information technology adoption in nonprofit organizations. There exist some interesting though surprising findings in the three studies that open a door for more future studies about information technology adoption in the nonprofit sector. There remain many puzzles in nonprofit technology adoption ranging from the macro level to the micro level. For example, why do nonprofit organizations lag in utilizing information technology compared to their counterparts in the private sector? What are the barriers for nonprofits to adopt information technology successfully? How can nonprofit organizations strategically allocate resources in information technology? How can nonprofit organizations balance the quality and quantity of information with the assistance of technology? What is the turning point of information technology input for donors to become aversive? How can nonprofits utilize social media to engage the stakeholders and maximize the benefits? The dissertation calls for more future research on the topic of nonprofit technology adoption.

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