Money, God, and SMS: Explorations in Supporting Social Action Through a Bangladeshi Mosque

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ABSTRACT
Religious institutions hold a significant place in daily life for the vast majority of people in the world, especially in developing countries. Yet despite their social prominence, and despite HCI's emphasis on the social context of technology, organized religion is neglected in both the HCI and ICTD literature. This paper explores the relationship that mosques in Bangladesh have with their constituencies and with technology, with an eye toward the integration of technology with existing religious institutions as a way to achieve positive social ends. We first describe a qualitative exploration of several mosque communities in Bangladesh, where we find that skepticism and pragmatism about modern technology interact in a complex way that nevertheless leaves room for technical interventions. We then describe a randomized controlled trial to study the relative value of SMS messages infused with overtly religious or secularly altruistic frames for the purpose of mosque fundraising. We find that SMS messages increase donations overall, but that their framing is significant. Messages with secular altruistic framing increased donations by 9.5%, while those with religious sentiment increased donations by 57.3%. Our findings demonstrate how technologies like SMS amplify underlying religious forces and suggest the possibility of working with religious institutions in applying positive ICT interventions.

Author Keywords
ICT4D; religion; techno-spirituality; SMS; donation

ACM Classification Keywords
K.4 Computers and Society; H.1.2 User/Machine Systems

INTRODUCTION
Organized religion plays a significant role in the lives of a great majority of the world's population [26], and religiousness is known to be inversely correlated with wealth [12]. Meanwhile, there is a vast literature in HCI and information science asserting that social institutions in socio-technical systems are critical in ensuring that technologies have their intended impact [7, 15, 44]. A subset of this literature focusing on international socio-economic development further suggests that impact is dependent on institutional capacity [62, 64]. Together, these propositions suggest that religious institutions ought to be a primary site of interest for those seeking to cause socio-economic impact in the developing world through technology. Yet, religious and spiritual institutions, and specifically their relationship to information communication technology (ICT) rarely appear in the literatures of HCI, information systems, and ICT for development (ICTD).

Some research on ICTs in religious contexts exists. Researchers in the early days of the Internet examined how ICTs were being used in religious organizations for daily operational purposes (e.g., accounting or email) [41]. Other work considered resistance to change in certain religious communities [49], the relationship between religion and technology [3, 39], and implications for design and theory [68]. However, there is little work on technology use by religious institutions in developing countries [68].

This paper takes early steps toward understanding how computing technology could be applied in collaboration with religious institutions in the developing world to achieve positive social goals. We studied the practices of several mosque communities in Bangladesh and considered how technology could be used to help one particular institution. After several months of dialogue and engagement, we gained insight into the mosque's organizational structure, its relationship with the surrounding community, its nuanced attitude toward modern technology, and its various goals. We then incrementally assisted the mosque with several technology-focused improvements to mosque operations, as a way to gain trust and further understanding. Finally, we designed and implemented a more ambitious intervention to increase mosque donations through SMS messages in a way that we believe simultaneously satisfied values held by the mosque and ourselves. Through a sixteen-week randomized controlled trial, we tested (a) whether SMS messaging can be used by a mosque to increase donations, and (b) whether appeals to religious sentiment or secular altruism in SMS messaging led to greater donations.

Our work informs the HCI community with respect to several questions: What relationship do developing-world religious

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organizations have with digital technology? What kind of technology interventions might make sense both to the leadership of a developing-world mosque and to those with more secular values? How do different kinds of very brief, SMS-constrained messages affect rates of giving among a religious constituency? And more broadly, could religious institutions be meaningful partners in attempts to cause positive social change? To the best of our knowledge this is the first study both to explore a developing-world religious organization's relationship to ICT and to experiment with the effect of religious versus secular altruistic messaging for fundraising in the context of a religious institution.

RELATED WORK

Three areas of related research frame and influence our work: religion and HCI; SMS-based ICT interventions; and fundraising technology.

Religion and HCI

Prior work has emphasized the importance of working with established institutions to achieve technological impact [7, 15, 64], but thus far religious institutions have been neglected in the HCI literature. Religious organizations have many of the same features as other large actors in international development, but they also have unique elements. They transcend national and linguistic boundaries; they comprise a wide range of socio-economic strata; and they often control very significant financial resources. Yet, they have value systems that can be at odds with modern secular values; they tend to act as federations of small, locally autonomous organizations, even when there is a strong, centralized hierarchy; and, they have wide-ranging and deep relationships with many of the intended beneficiaries of development efforts. Indeed, over 80% of people in the world are religious [26], and in developing countries, the figure frequently exceeds 95% [26].

Despite religion's prevalence, however, research on religion within HCI and ICTD has been sparse [11]. Muller et al. [43], and later Bell [6] speculated that there could be inherent tensions between technology and religion. Bell coined the term and elaborated upon a "techno-spiritual" framework for the study of this research space. Since then, several studies have documented the practices of mediated prayers and discussion of religious content online [6, 8, 10, 41, 71, 70]. A few papers have also explored the potential techno-spritual design space [24], which includes tools for online meditation [29], mobile phones for religious participation [56], mobile applications for prayer [69], and home automation during Sabbath [67]. Of the literature, the work most closely related to ours is Wyche et al.'s discussion on the connection between secular and religious aspects of life in the United States and Kenya [68]. But where other work describes existing appropriations of technology for religious purposes, or designs of applications to assist in spiritual practices, our goal is to consider how technology might be incorporated into existing religious institutions for the sake of positive social ends.

SMS Reminders

SMS-based systems are an established tool for clinical and health behavior interventions [65]. Within healthcare SMS-based reminders have been used for improving medication adherence [13, 57], clinical management [37, 54], and health-related behavior modification [47]. Information and education interventions through voice and SMS reminders have been demonstrated to improve health outcomes [40]. Due to the lack of high-tech networked and communications infrastructure in developing regions, SMS-based systems lower the barriers for entry for applications such as healthcare [9, 30]. In the HCI literature, Perrier et al. [48] showed how a hybrid SMS messaging system can leverage the capabilities of both human and computer in a healthcare application. Other applications for finance such as SMS-based mobile banking are also growing in popularity [32, 51, 61], and recent mobile marketing strategies have used SMS as a platform for real-time communication with mobile consumers [35, 52].

The effectiveness and user acceptance of SMS-based services in relation to the SMS content has been widely discussed. One study of an SMS-reminder system for blood donations found a significant positive relationship [23]. However, the study also reported that such relationships are affected by socially accepted norms. The role of user attitudes in their adoption of ICTs has also been explored extensively [19, 63]. Densmore [16] found that SMS messages could be used to establish communications for health financing in Uganda, but SMS alone was not enough to maintain effective relationships. Our work differs from previous research in its focus on working with religious organizations, and on the differential impact of SMS messages with religious or secular framing.

Fundraising Technology

Motivations, inspirations, and deterrents in fundraising activities have been also discussed widely across different disciplines both from fundraisers' and donors' perspectives. Weisbrod and Dominguez's traditional economic model of fundraising states that donors' contributions are determined by price, the organization, and quality of the information [66]. Gerber et al. [20] and other works [50] described the motivations for crowdfunding activities including helping others and being a part of the community. Klein discusses fundraising for social change as a grassroots collective practice [38].

Specific to nonprofits and community organizations, Goecks et al. [22] outlined six roles that technology plays in fundraising. Three of these roles interact with our work. First, the organization communicates with donors through technology channels regarding its activities, goals, and impacts. Second, technology is used by the leadership to provide information regarding the organization's activities and improves trust regarding financial practices. Third, direct exposure to technology can change attitudes of the organization toward technology. Similar to our work, Merkel et al. [42] described challenges of and methodological approaches to sustainable IT management practices in community non-profit organizations and stresses the understanding of socio-technical dynamics in relation to IT use and adoption in community organizations. We conduct an exploratory study to first understand the existing dynamics surrounding fundraising and ICTs in an effort to cope with these challenges when designing our intervention.

EXPLORATORY STUDY

To better understand the mosque context, we conducted an exploratory field study in both rural and urban communities in and around Dhaka, Bangladesh, one of the most densely populated cities in the world [45]. With more than 1,900 mosques, it is popularly known as the 'City of Mosques' [31]. Though there are many mosques of historical import, every neighborhood community has a community mosque of its own. In most cases, community mosques are part of a larger complex that includes an orphanage, a *madrasah* (a school for Islamic education), and a religious learning center for children. These community mosques function as a commons for social interaction [31].

Method

In April, 2015, one of us (the first author) began an exploratory study in the rural Mymensingh area where a local Islamic cleric helped us reach five different mosques and two madrasahs. Raised Muslim in Bangladesh, the first author was well aware of the challenges of engaging with religious organizations [11] and convincing them to agree to a decidedly secular research agenda.

For nearly three months we conducted a qualitative study of these communities that consisted of weekly visits to the mosques. We conducted unstructured interviews with mosque affiliates and participant observation in mosque rituals and activities. Participants were chosen by purposive snowball sampling. We spoke with the *imam* of the mosque, the clerics, students in attached *madrasahs*, the management committees, and the members of the mosque community who come to pray.

The themes were high-level at the beginning: existing religious practices of the mosque, the integration of those practices with the civic goals of the greater community, the form and nature of the mosques' relationship with their surrounding communities, and the mosque constituents' relationship to ICTs. Toward the end of our study, we concentrated our attention on one specific mosque in Dhaka, the Sabujkanan Mosque, where the first author has been a moderately active member for eight years. As we began focusing on this mosque, some portion of our time was also spent performing light technical assistance for the mosque leadership, which we describe below. Once it became clear that our primary mosque was most interested in help with fundraising, we further concentrated our interviews and observations around fundraising and the mosque's financial organization. Upon deciding to work with the fundraising of the mosque, we converged upon more focused predetermined themes: the mosque management committee and their roles in fundraising, the madrasah and orphanage activities and their funding sources, the community engagement in the fundraising and overall mosque activities. IRB approval was obtained for all phases of our research.

As requested by mosque leaders and clerics, we did not record the interviews and avoided shooting photographs or video. All primary data was thus recorded as handwritten notes by the interviewer. A few additional sources, including mosque-generated record books and donation journals were also used. Since we had an interventionist goal in mind, our analysis was based on the general inductive method [60] with few a priori expectations about what we would discover. Similar to a grounded theory approach [58], we considered sections of our notes by theme, and recorded brief thematic summaries of related portions of the data. These themes were discussed by all authors in bi-weekly conversations which also often resulted in new or confirmatory questions that were asked and answered in subsequent visits to the field. For the purposes of this paper, we discarded data that did not contribute to an understanding of the mosque's general goals and operations, technology-related topics, or opportunities for partnership.

Findings

Our exploration yielded a significant body of notes and insights that went well beyond the issues of mosque goals and relationship to technology. Below, however, we focus on those topics that illuminte potential areas for collaboration on social programs, issues related to technology, and issues related to fundraising.

Mosque Rituals

Among Muslims, the most salient activity is prayer. As is widely known, Muslims pray five times a day, at dawn, midday, afternoon, sunset, and evening. Each prayer session is preceded by a melodious call to prayer that is broadcast using several electrically powered loudspeakers around the mosque. These are loud enough to be heard throughout the local community. Attendance at mosque prayers varies by time and occasion. Attendance is greater during the sunset and evening prayers when people are home from work. Attendance also increases severalfold during *Ramadan*. After the evening prayer, some devotees stay for and additional 15 to 20 minutes to discuss Islamic rules in religious practice and in daily life. Toward the end of these sessions, the assembly discusses more practical problems in the neighborhood along with possible solutions.

Another well practiced Islamic ritual is the weekly *jummah*, or Friday prayer, that occurs during midday. Attendance at jummah is typically eight to ten times that of other prayers. Many people come to the mosque only once a week for jummah. During jummah, there is a special session called the *khutbah* where the imam delivers a speech on a selected topic, typically discussing Islamic regulations and community practices. Khutbah can be fraught. As one imam informed us, *"We have to be careful of our speech during khutbah so that it cannot be interpreted either to go against the government or to inspire Islamic militants."* Sometimes, government or philanthropic announcements related to healthcare, local security, and disaster preparedness are also conveyed to the community in khutbah. Such announcements, along with occasional emergency announcements, are also broadcast via the external loudspeakers.

In addition to the loudspeakers, the mosques we interacted with used other ICTs such as calculators for accounting, digital clocks to keep time, an internal public announcement system to amplify the imam's speeches, and video monitors for public announcements.

Mosque Leadership

Every mosque has a management committee that is selected by the people within the local community during an open meeting. The committee comprises a general chair, 3 to 5 secretaries, and 8 to 10 general members. Serving on the committee is voluntary and uncompensated. Committee members thus tend to be retirees or local landlords who can afford the time. Sometimes, local political leaders join the committee. All are elected based on their perceived integrity and credibility among the local community. The main responsibilities of the management committee include recruiting employees both for the mosque and the madrasah; collecting and coordinating funds; utilizing the fund to pay the mosque staff; and expanding mosque facilities. Besides managing the mosques, the committees also work to contribute to local social activities and services. For example, we found some mosques that perform waste management for their communities.

The mosque management committee hires the imam in the mosque. The committee pays the imam a monthly salary and provides accommodation, utilities, and other amenities. The committee and the imam do not, however, have a strictly manager-employee relationship. The imam is more visible and venerated by the community than the committee members, and also ensures that any administrative decisions made by the committee do not conflict with Islamic law. On the hand, the committee has the authority to replace the imam, if the imam violates mosque rules.

Because the imams and committee members tend to be of higher socio-economic status, they all have mobile phones. Many committee members have smartphones, though their use tends to be limited to voice calls, texts, FM radio, and the occasional taking of photos. The committee members we spoke with sometimes also used a personal computer at work and many had one at home, though home PCs tended to be used by younger members of their families.

Social Services

Mosques often deliver social services, with two kinds of madrasahs being among the most common forms in Bangladesh. *Alia* madrasahs are registered, funded, and regulated by the government, and they include modern general education alongside Islamic education [4]. Apart from such alia madrasahs, many mosques have an attached *qawmi* madrasah, which are not affiliated with the government and focus only on religious training. Unlike alia madrasahs, many qawmi madrasahs also manage an orphanage. These madrasahs recruit students and take on orphans from inside and sometimes outside the local community. The madrasah arranges food, accommodation, basic healthcare, and educational expenses for the students and orphans. Usually, the madrasahs are funded from the internal fund of the mosque, which is separate from the greater mosque organization. Funding for the madrasahs is mostly raised through donations from community members.

For approximately 50% of students and orphans, food is arranged by lodging them in a community member's house where they receive three meals a day. The community members who receive these students are not financially compensated. The mosque leadership works hard to make arrangements for as many students as possible, but funds and space are both limited. Students in the madrasahs also voluntarily contribute to different community activities such as fundraising for medical support, repairing potholes, or taking part in social functions.

We also found some mosques that performed vaccinations for local children, oversaw community waste management (by hiring individual waste collectors), and ran neighborhood watch programs where burglaries occurred.

Relationship with the Community

The mosque committees that we engaged with valued strong relationships with the communities they served, because community support is required for the mosque to survive. However, mosque leaders found it challenging to build and maintain trust with their communities. This point was emphasized several times by our respondents. Specific priorities mentioned by the mosque leaders include presenting a clear image of the community members and staff; delivering information about the activities undertaken by the mosque to those who do not attend regularly; communicating the costs of mosque activities transparently; and devising proper ways of approaching community members for donations. As one mosque leader explained,

"Look, many people only come to say their prayers. They need to know who is on the committee so that when we ask them for donations they don't doubt committee members' backgrounds or the use of the funds. We have many dependable people in the committee who are serving the mosque with their heart and soul. They also have good academic and financial backgrounds that can help earn the trust of the people. People in the community may already know them, but just don't know that they are on the committee."

Fundraising

Despite potential collaborations in education and healthcare, it became clear that the Sabujkanan Mosque which we ultimately partnered with was most interested having us support efforts to raise revenue. Having witnessed the various prosocial activities of the mosque, we felt that increasing the mosque's capacity to deliver such services was in line with our own values, though not as directly focused on them as we would like.[1] As we focused on increasing donations to the mosque, we sought to understand the mosque's fundraising strategy and tactics, and where in the fundraising process we could most have impact.

The mosque maintains a central bank account that serves as the locus of all financial management. The finance secretary of the committee performs all transactions and informs other committee members about each transaction. All donations are recorded in a single registry book. According to the committee, the mosque has established a trustworthy and transparent financial management system. We found that community

[1]The mosque, for example, was also in the process of building a new structure, and much of the funds raised were for that purpose. This, however, seemed no different from large non-profits and development agencies spending a portion of their donations on impressive buildings in Geneva or Washington, DC.

mosques and associated madrasahs employ four main strategies to collect donations:

Pledged giving. The biggest part of a mosque's funds comes from individual donations. The mosque maintains a registry containing individual gifts pledged along with phone numbers. A mosque representative calls the numbers of people who have pledged. People go to the mosque and give the pledged funds to the imam, a committee member, or other staff member working in the donation booth near the mosque. The mosque maintains a *donation log* to keep track of these donations. The donation log records the donor's name, address, phone number, and the amount of money donated. A copy of this information in the form of a receipt is given to the donor.

Donation booth. Mosques often have a permanent donation booth set up at a busy nearby road. A mosque employee is stationed at the booth for two sessions a day. The employee uses a small loudspeaker and continuously recites from the *Quran* or sings religious songs, and asks passers-by to donate money (see Figure 1). Donor information is not recorded for gifts made at the booth.

Staff and committee collections. Mosque committee members, the imam, and the mosque staff often tap their friends and acquaintances for gifts. These relationships may go beyond the local community and include professional connections, hometown connections, and connections abroad. Several committee members are also landlords and will approach their tenants. As with individual donations, receipts are maintained for such donations as well.

Jummah box. The mosque collects donations during jummah each Friday using a number of locked collection boxes. The boxes are passed down each row and people insert donations. After jummah, the mosque staff collects the boxes and records the total collected amounts in the main registry. The money is then deposited into the mosque's account. Donor information is not recorded.

Figure 1. A mosque's donation booth and employee on the loudspeaker.

Mosques occasionally employ methods other than the above four. Many mosques place locked donation boxes in busy places (e.g., in a market, at a busy intersection) with written requests for donations. Another strategy is for students to sit by the side of a road with a loudspeaker and small table during festivals to recite from the Quran and explain the benefits of donating. Finally, mosques sometimes print leaflets and distribute them locally and in other localities.

Techno-Spiritual Tensions

Information communication technologies are not always welcome or compatible with religious ideas and beliefs. Some interpretations of Islam explicitly prohibit watching movies, listening to recreational music, or interacting with members of the opposite sex outside of marriage. In Bangladesh as in other developing countries, these interpretations are common, though not absolute [28]; they are more strictly followed by mosque leaders, but not by all community members. This tension has been explored to some extent in previous work [6], but few designs have successfully mediated this tension [11].

It was, therefore, unsurprising that some of the initial comments and questions we received were hostile and suspicious. One imam said to us, *"Television is Satan's box."* That imam did not watch television and forbidded his family (his sons and wife) as well because he believed that television programs distract youth from Islam. Other mosque leaders told us that they only used their mobile phones for talking, even though many owned feature phones with some multimedia capabilities. When we asked a madrasah teacher about mobile phones, he told us, *"Mobile phones will destroy our students."* This teacher discouraged students from using mobile phones even for emergencies. In general, teachers are concerned that students may be using the phones for entertainment and other activities prohibited by the mosque. When we expressed our interest in working with the mosque committee on a technology project, the committee members asked us, *"Are you a blogger?"* Around that time, several non-religious bloggers had been killed by Islamic militants [53], which increased tensions around the mosque. All of the mosque leaders we spoke with were careful with respect to technology; they believed subversive bloggers used the Internet, and thus, the Internet was not to be trusted. Although nearly all of the committee members held bachelor's degrees, we received many questions that indicated hostility toward or ignorance of technology. However, technology apprehensions were not uniform. A few young committee members enthusiastically suggested using a Facebook page for the mosque to help reach the community easily and quickly spark discussions about the mosque, but they also anticipated some challenges:

"I was thinking of opening a Facebook page for the mosque, but then I realized that I am too busy. I have a job you know; most of the committee members have jobs as well. The imam and other staff could have time to maintain a Facebook page, but they won't do it as there are women's profiles on the Facebook and it is forbidden to be on the same platform as women and communicate with them."

Changing Technology Perceptions

The mosque community's generally suspicious attitude towards technology made our efforts to suggest a technology project challenging. But Islam has no specific prohibitions against technology use, per se, so we tried to see whether

there were uses of technology that the mosque leaders would approve. Through ongoing discussions over multiple visits, we were able to unpack some of the fears and eventually change attitudes. Our approach was to raise awareness, educate, and demonstrate the potential benefits to the mosque.

For example, given the mosque's interests in engagement with the community, we suggested that we could help the mosque setup a website, but they initially refused. We showed them the websites of several other mosques to try and convince them, but as one senior community member explained, *"We cannot introduce a blog for our mosque. You know what is happening. Some bloggers have been killed recently."* But in a later meeting, one junior committee member brought up an example of a fishermen's village that raised money using a website and social media to build a school. Eventually, these and other discussions managed to convince the clerics and senior committee members to setup a mosque website. In a series of meetings during which we set up the website, the mosque committee was exposed to and trained to use basic content-development software. Later, as we prepared to launch the site, one committee member commented, *"If we can provide this information on the website, then we can earn [the community members'] faith."*

Another example also involved efficient communication. Mosques are always looking for opportunities to invite people from organizations who might make large donations. During the courting process, a mosque needs to maintain good communication with the organization, but correspondence is traditionally delivered through direct mail. The mosque leaders consulted with us to develop a faster and more formal communication strategy. We thus helped them open an email account and taught them how to use email not only for maintaining connections with donors, but also for collaboration within their committee. Since then, the staff has been using email as an important component of the mosque's communications. We also taught staff members to use common computer applications including spreadsheets to keep donation information, PowerPoint for printing banners, and applications to share donation records with others online. Over the course of our engagement with the mosque staff they gradually developed more positive attitudes toward technology.

Intervention Possibilities

As our engagement intensified, we started looking for potential technology interventions that could benefit the mosque community while also achieving secular socio-economic development goals. The mosque leaders eventually invited two young mosque members who had experience with technology to participate in these discussions and to advise. Through these discussions, we identified three major concerns. First, around the time we started our study, Bangladesh had witnessed several incidents involving the killing of online activists. Additionally, extremists had begun threatening sacred institutions of other religions and a Buddhist temple was located nearby. These extremist threats caused dramatic increases in government security forces surveilling the area. Second, the imam and his assistant clerics were responsible for ensuring that technology engagements did not violate Islamic laws. To satisfy this requirement, every possible intervention had to be discussed with the imam in the presence of one or more committee members and the appointed members with technological knowledge. Third, as the mosque and the attached madrasah are community funded and driven, the mosque leadership wanted to make sure that our intervention was approved of by the community.

The leadership asked us to help find technology solutions that would increase revenue and community engagement. We considered each of the following.

Mobile media. We found widespread use both among mosque leadership and members, of mobile media for recording and spreading religious speech. Community members and leaders frequently attend religious conventions arranged by mosques and other religious organizations. At these gatherings, people recorded religious speeches on their smartphones and shared them with others. Since only a few people in these communities own smartphones, these recordings are often played and discussed in a group setting. One young committee member spoke with us about the possibilities of using such recording technology for madrasah education. The committee member's idea was to introduce recordings to help students reciting the Quran identify their mistakes and at the same time reduce the workload of the imam. However, while the teacher of the madrasah believed it would be useful, the senior members considered the costs of the technology and content production prohibitive.

Mobile money. Over the past few years, mobile money has been adopted in many countries due to its convenience and efficiency in personal and business financial transactions [5, 33, 17], and Bangladesh's bKash is among the world's most used mobile money services. In our meetings with the committee, we asked for their opinion on introducing mobile money so that potential donors could send their donations directly to the mosque. There were objections to this idea, but they were notably non-religious. The chair of the committee commented,

"Yes, mobile money transactions can be easy, but it can also create problems. We have two common [bank] accounts where we have simultaneous access for some committee members. So, when any money transaction occurs, others know about it. It is easy to coordinate. But if you create a bKash account for the mosque, someone has to carry that number. If [bKash] does not show any record of transaction, other members will not know about how much came in a day. It might create distrust among committee members."

SMS-based donation reminders. The leadership believed that they could increase donations by making regular broadcast calls (through their public speaker system) to all community members. We suggested instead an SMS-based reminder system rather than broadcast audio, and this idea was eventually adopted by the leadership for three reasons. First, given the mosque's concerns and strict adherence to proper processes, SMS was the least intrusive intervention. Second, since there were many existing mechanisms for collecting donations, it seemed more useful to complement existing channels than to introduce a new collection mechanism. Third, the

ubiquity of SMS and ease of deployment was high compared to other technology options such as voice calls or smartphone applications.

RANDOMIZED CONTROLLED TRIAL

To make the best use of an opportunity to apply a technology intervention with the mosque, we ran an experiment to understand what kind of messaging would impact donations. In particular, we noticed that the mosque used references to Islamic sacred texts – the Quran and Hadiths – to convince people to donate, so we were curious about whether religious framing was an effective practice compared with, say, appeals to altruism. Our hypotheses were that SMS reminders from a trusted mosque would indeed increase donations, and that given the mosque context, religious appeals would be more effective than appeals to altruism. For our randomized controlled trial (RCT), we designed, implemented, and evaluated an SMS-based system intended to increase donations to the mosque. The system prototype was developed between June and September, 2015, and its roll-out and evaluation took place between October, 2015 and March, 2016.

Study Site

We continued to work with the Sabujkanan Mosque for this phase of our study. At the time, the mosque was going through a renovation process to accommodate its growing community. The estimated funding needed to complete the renovation was more than 10 million taka (~130, 000 USD), mostly from individual donors. Mosque committee members also went to both private and government organizations to collect funding for the renovation. By the beginning of our RCT, a quarter of the total construction work was completed, costing more than 3 million taka (~39, 000 USD).

We discussed our research plan with the mosque committee in the beginning of August, 2015. The mosque committee wanted us to ensure that the research would not violate any Islamic rules. In particular, Islamic law prohibits participation in games of chance, and an RCT includes an element of chance. So, we explained our proposal in detail with the Imam and other clerics who gave us their approval and conveyed their opinion to the mosque committee.

Participants

To gather participants for our RCT, we collected the mobile phone numbers of people in the mosque community. No other personal or identifying information about the participants was collected. We collected numbers through three sources: We collected 77 phone numbers from the pledge log. We collected 31 phone numbers from the donation log. Finally, landlords on the committee were requested to talk to their tenants about using their mobile numbers to remind them about donating. They managed to collect 120 phone numbers. In total, 228 phone numbers were collected.

Procedure

Our 228 participants were divided into four groups of 57. We employed a RCT with a 2x2 factorial design with three treatment groups and one control group: The *religious* group received only SMS messages with religious sentiment, the *non-religious* group received secular SMS messages appealing to altruism, the *both* group received both the religious and secular messages separated by five minutes, and the control group received no messages.[2] The order of non-religious and religious messages sent to the 'both' group was reversed each week. We randomly assigned members from our participant pool to each of the groups [36]. Groups were stratified by the source of the phone numbers (i.e., the various logs), as well as by their past donation history and frequency of mosque attendance where known.

We prepared a set of four secular and four religious messages. The complete set of messages are included in the supplementary materials. Each of the four secular messages contained a few words focused on secular goals of the mosque community (e.g., youth empowerment, local security, healthcare, elementary education), with no religious sentiment. An example of a secular SMS message:

Regularly meeting with your neighbors strengthens our community. When people see each other regularly, trust develops and there is an opportunity to discuss and solve problems together. Supporting institutions that build community helps ensure social security in the neighborhood. Support institutions that allow neighbors to gather together to strength social bonds. Let's donate to Sabujkanan Jame Mosque.

Each of the religious messages began with a verse from the Quran or the Hadiths. The verses were related to the worldly and otherworldly benefits of giving. The verses are followed by few words to encourage donations. An example:

Rasulullah (SM)[3] *says, "People say that my wealth is mine. Yet wealth used only in three cases is his wealth: What he has finished eating, what he has wasted wearing, and what he has deposited donating. He will leave the rest of his wealth, people will take away that." (Muslim)*[4] *So, donate for the building of Sabujkanan Mosque, deposit your very own wealth for afterlife, for you and for your parents.*

Both types of messages were two text SMS messages in length. The SMS messages were written in Bengali, the native language in Bangladesh, and initially transliterated into English characters. All messages were approved by the mosque committee. A mosque secretary made announcements every two weeks at jummah about the SMS reminders, so that participants knew they might receive such messages. In addition, the name of the mosque was included in every message so that recipients would not ignore the messages as spam. We requested at jummah that participants report any problems regarding SMSs, but no complaints were voiced.

After splitting the participants into groups and finalizing SMS messages, we prepared an automatic SMS messaging gate-

[2]Each week the *both* group received *two* messages, i.e. both a religious and non-religious message. In retrospect, this was not ideal, as we cannot attribute the differences in the *both* group to the fact of additional messages or the combination of messages. However, sending only one religious or non-religious message each week to the *both* group would also have had limitations.

[3]A common shorthand for "sallallahu alaihi salam" (may Allah send prayers and peace upon him)

[4]"Muslim" is one collection of Hadith

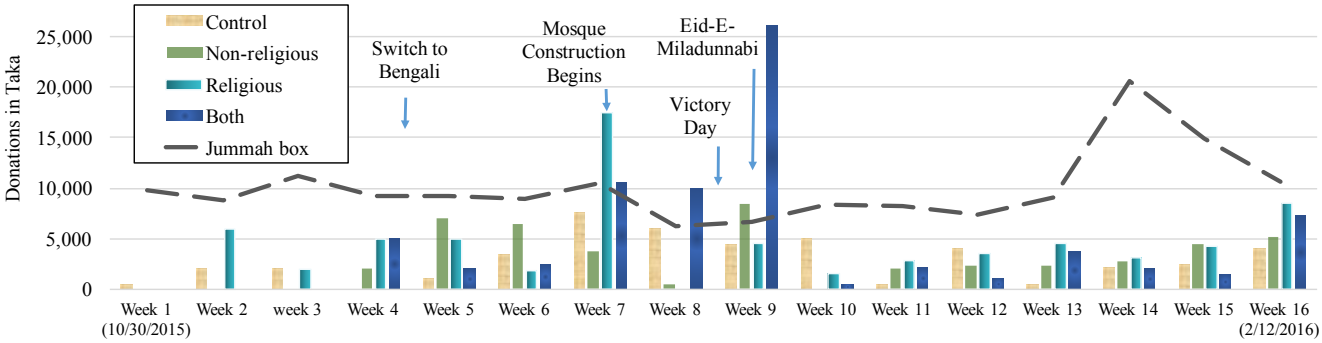

Figure 2. Weekly donations per group over the sixteen week RCT.

way and started sending messages to the participants on October 24, 2015. We continued to send SMS messages each week until February 5, 2016. Since the jummah collection box was anonymous, we were unable to collect data on donation behavior through that source. To minimize the impact of this on our study, we scheduled the sending of messages on Saturdays at 11:00am (the day after after jummah). Saturdays are a government holiday in Bangladesh and sending SMS messages on Saturdays enabled participants to be reminded to bring money during their prayer that day.

The same set of four messages were sent once a week in sequence in four rounds. Each round was four weeks long. In the first round, the messages were sent in Bengali language using English characters because of the widespread practice of using English fonts in short messages. Starting the second round, and following a suggestion by the mosque committee that most mobile phones supported Bengali fonts, we used Bengali for the rest of the study.

Prior to sending any messages we met several times with the mosque committee to remind them to continue to keep track of the individual donation records. Keeping track of the donation log was straightforward; the mosque committee collected the donors' mobile phone numbers and gift amounts. The staff working in the street-side donation booth was also instructed by the mosque committee to note down the the phone numbers of donors who donated more than 30 taka (~0.40 USD). We also requested the committee landlords to note down the phone numbers and amounts donated by their tenant donors. We could not come up with a method to keep track of individual donations to the jummah box, but we tracked total gifts each week. We continued to collect donation records until May 2016 (approximately 3 months after our study period) to minimize the possibility of missing any delayed records. We rejected approximately 10% of the collected donation records due to lack of phone number information indicating a donor as a study participant.

Results

Figure 2 illustrates the total donation amounts per group over the period of our sixteen week RCT. Since the donations each week are highly variable, we used a four week sliding window over the sixteen week period to reduce this effect and conducted a two-way ANOVA. The two factors of the ANOVA are the 'non-religious SMS messages' and 'religious SMS messages'. The two-way ANOVA shows that a statistically significant difference exists between the groups ($F = 5.20$ and $p < 0.01$). Tukey's post hoc tests were conducted on all pairs of groups given the statistically significant ANOVA. All pairs of groups were found to be significantly different. Our results show that while secular SMS reminders increased donations by 9.5% over no reminders at all, religious SMS reminders increased donations by 57.3%. Furthermore, sending both reminders increased donations by 77.5%, suggesting a super-linear effect of including both kinds of messages. These differences correspond to total increases in donations of 57 USD, 341 USD, and 461 USD, respectively. About one third of our participants made gifts in a traceable way during our trial, so this comes to increases per donor (not per participant) of approximately 0.99 USD, 5.99 USD, and 8.10 USD, respectively, over the 16-week period – considerable for a group whose income we heard to be between 10,000 and 30,000 taka (130 – 390 USD) per month. On top of the control group average donation of 803 taka (10.45 USD) and standard deviation 2,136 taka (27.77 USD), this represents increases in donations of 0.035, 0.21, and 0.29 standard deviations, respectively – quite high for the groups receiving religious messages.

The weekly donation records followed a positive trend in terms of the amount of total donation over time in all of the four groups. While the overall trend is increasing for each group, the donations all increased during the second round from week five to week eight likely due to the switch from transliterated Bengali to Bengali script along with two Islamic events. There were also a few dips in donations corresponding to national and international holidays, and the end of the year. According to the mosque committee, donations decrease during the start of a new year because people become busy with work and pay less attention to the mosque.

In addition to the donation amounts, the number of people who donated per week increased over time. The number of donors was lowest at the beginning of the study for every group. Gradually, the total number of donors per week increased until the end of ninth week. As with the total donation amount, from the beginning of the tenth week, there is a decrease in the number of donors corresponding to the end

of the year. The number of donors slowly began to increase again following the tenth week until the end of the study.

DISCUSSION

Religious-Secular Collaboration

Our findings suggest that mosques can be a viable partner for ICT projects that seek positive social goals, and much in the way we hypothesized: Where religious and secular goals align, a mosque serves as an institution trusted by the local community, and whose efforts technology can amplify.

We discovered several advantages to working with mosques, as well as challenges not found with non-religious organizations. One of the advantages is that at least in Bangladesh, mosques are already seen by the government and by citizens as a provider of some public services. In some cases, this means they receive public funds to provide social services. On the other hand, decision-making remains local and largely autonomous, so negotiations can occur relatively swiftly – even in spite of initial resistance – without the obstacles of a rule-bound bureaucracy. In addition, mosque leaders are in contact with other leaders of other mosques, so there is also potential for any practice adopted by one mosque to spread to others by word of mouth. As we saw in our engagement, the activities of one mosque can serve as inspiration to others.

Several advantages were unexpected. One was mosque leaders' skeptical stance toward technology, which meant they were inherently focused on the practical outcome of any technical intervention; they were not tempted by shiny gadgets for their own sake. Another advantage was that because Islam is open about its goals and directives, it was straightforward to identify points of alignment as well as of conflict. Unlike other development actors which can be opaque or coy about their motives, we found mosque leaders to be direct about what they wanted in a collaboration.

Among the challenges is that projects must comply with a host of religious rules and guidelines, not all of which are immediately apparent. A related issue is that some compromise is required to achieve secular ends – in our case, our impact on the community was indirect at best, with any increase in mosque revenue likely to be diluted among multiple projects, not all having socio-economic impact. Also, the time required to establish mutual understanding and trust is arguably greater in a religious-secular partnership than among collaborators which share a secular outlook. Our project was facilitated by a long-time member of the mosque community, but even so, it took months of discussion and negotiation to reach a point where we could discuss meaningful collaborations. It is not at all clear that an outsider could have achieved the same results.

The tradeoff between these advantages and disadvantages is difficult to gauge, at least with our limited scope. Nevertheless, we found that the mosque itself benefited from and appreciated our efforts. Four notable changes were reported to us or observed anecdotally. First, among the mosque leaders there was increased discourse surrounding technology as they were convinced that it could be appropriated in useful and religiously compatible ways. Second, the younger members of the committee had greater opportunity to voice their ideas in the mosque's decision-making processes, as they were seen as more knowledgeable about ICTs. Third, the community members learned more about the mosque and engaged in more activities and decisions. Fourth, technology began to play a role in fundraising, record keeping, and communications. Taken together, the mosque constituents began working together to improve their community through technology adoptions appropriate to their religious considerations.

The increased donations achieved through our intervention were appreciated by mosque leadership. The mosque committee applauded the increase after the RCT for two reasons beyond the increased fundraising output. First, the SMS reminders helped them easily and consistently reach the the majority of people in their community. After our RCT, the committee felt that SMS messaging was an easy way to convey other mosque messages and increase community engagement. Second, though our study was limited to the local community, it provided a basis for the mosque leadership to imagine other ways of using the introduced technologies. For example, one idea that the committee suggested was to combine SMS messaging with a link to the newly launched website to reach distant donors. By the end of our study, the committee was considering the purchase of a computer so that they could be more technologically self-sufficient.

Community Engagement

Community participation and collaboration are often crucial in addressing social and economic issues [14, 55, 18]. On many occasions organization-community relationships have been demonstrated to benefit both parties [2, 1, 25]. Thus, increasing community connectedness with formal community organizations can be instrumental in solving local problems. By building on the existing social interests and political structures, technology can be an effective tool for introducing additional services [62].

Beyond expanding the technology discourse, our engagement with the mosque community led to other forms of engagement. Specifically, long-term SMS messaging in the mosque community led to reports of increased community engagement in mosque activities. Many of the participants included in the study were not regular mosque attendees. These regular SMS message reminders created a sense of connectedness to the mosque even though they were largely absent. The mosque committee informed us that they received a greater response from the younger community members in their madrasah programs who later wished to volunteer to help with fundraising. A number of community members began visiting the madrasah and orphanage and spoke with students there. Community members mentioned that the mosque was 'active' and 'more than a prayer hall'. Some of the secular messages provided up-to-date information about mosque construction, madrasah education, and community security. The mosque committee mentioned that many participants spoke with mosque clerics, staff, and the committee regarding these issues during the period of the study. The imam's appreciation of our efforts was expressed indirectly:

"People used to spend much more time in the mosque. It was the center of governance activities and rules were made here.

Now, times have changed and the mosque has become unimportant. If you can make the mosque the center of the community without violating Quran and Sunnah with your [technological intervention], then you will be blessed."

Trust and Transparency

Prior to our study, the mosque used several different ways to increase transparency including announcing the collected sum from the jummah boxes in the previous week and occasional announcements of the collected amounts of the past months. While these announcements were useful, they were unable to reach the majority of their constituents. A similar issue of legitimacy is examined in recent work that describes the importance of making information visible in charitable organizations so as to establish stronger personal connections with their donors [59]. After the mosque website was online, the committee requested that we include the weekly donation log and appointed a committee member to work with us to figure out the proper format.

Outside the local community, as the mosque began construction the committee attempted to reach out to several ministries for donations. Before doing so, they asked us to upload several documents on the mosque website, which included the detailed design of the mosque and an estimate of the costs from the construction firm. One committee member said,

"The good thing for our mosque is that we have a website now so anyone can see what's happening and what we need. As you can see, we are stuck in the middle of the construction because we don't have funds to complete it. ... We are planning on approaching [our connections] for gifts because they usually donate to such causes, but they don't have time to come visit the mosque. If we can put all the required information on the website, they may be convinced to give."

The relationship between trust and transparency also surfaced during our discussions with mosque leadership about the introduction mobile money for donations. In the literature, complex service charges [27] and security threats [46] in mobile money have been examined in prior work, but there are further opportunities to study and improve the transparency of modern digital services, especially mobile financial services. These questions surrounding transparency of ICT-based tools, particularly for financial transactions, have also been noted in other developing contexts [21].

Limitations and Future Work

There are several limitations to the generalizability of our study. For one thing, we engaged with only five mosques in Bangladesh and only one with significant depth. We believe that most of our findings hold for a broad range of community mosques in Bangladesh, but no comprehensive generalizations can be made, and certainly not outside of Bangladesh.

Another limitation is the degree to which religious messages might have impact in other contexts. We designed the study under the hypothesis that religious messages would do well when coming from a trusted religious organization, so it is not clear whether similar results would be obtained in other contexts, even if they are religious in nature. Additional factors likely tilted our pool of participants toward the more religious (and therefore, more likely to be swayed by religious messages): Announcements about the project were made during jummah, but regular jummah attendees are among the more religious members of the community. And, the sources of participant phone numbers meant that they were all people who had donated at least once before. Though these biases in the total sample reduce the external validity of our work, they are within the scope of the theory that technology amplifies underlying human forces. Nothing we found suggests that the technology caused people to do things they were not already inclined to do. It would be interesting to confirm the degree to which similar results hold outside of a religious organization, or completely outside a religious context.

Another major limitation of our study is with gender. Almost all of our participants were male. Even though women make donations to the mosque, they do so through male family members with few exceptions. This bias is not unusual given how women's participation is inhibited otherwise in the community we worked with, as well as in other religious and developing contexts [34]. Nevertheless, there is scope for future research to make women's participation in religious institutions more visible.

We encountered other challenges that constrained our study. For example, we would have liked to have asked how users felt about the SMS messages, but that would have required further testing the rapport we had with the mosque leadership. Given the sensitive nature of our intervention, we hesitated to push the leadership for this level of access. Instead, we relied on indirect feedback we heard from committee members. Longer engagement with the mosque might allow us to interact more directly with community members, unmediated by the mosque leadership.

CONCLUSION

This paper presented an exploratory qualitative study and RCT conducted with mosque communities in Bangladesh. We found that despite challenges and initial hesitation, it was possible to run an ICT project with outcomes that supported both the mosque and our own non-religious socio-economic development goals. Selectively applied, technology can amplify existing inclinations in a religious organization that also tend toward secular objectives. Moreover, we experienced distinct advantages to working with community religious organizations that are not always present with secular development institutions. We believe this research opens up a range of future work that engages with religious organizations and communities for the sake of causing positive, secular social change.

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