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Highlights

- Mobile payment users can have purchasing anxiety.
- Users are concerned about their accounts being hacked, or lost.
- Characteristic-based trust is still relevant in mCommerce.
- Designers should consider ways of obscuring private details.
- Companies should create stronger ties to their systems.

TRUST AND MOBILE COMMERCE IN NORTH AMERICA

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ABSTRACT

Mobile Commerce (mCommerce) activities include the act of shopping and buying on mobile devices, along with the more recent emergence of mobile payment systems. Within North America, mCommerce activities have become increasingly popular and will likely continue on this upwards trend as mobile devices further proliferate markets. Historically, one common issue with the adoption and use of eCommerce systems (e.g., commerce activities on personal computers) is trust. Yet we know little of how trust and other social factors may affect mCommerce usage—a new genre of commerce activities that explicitly occur on mobile devices. To help address this problem, we have conducted two studies that explore users' mCommerce activities. The first is a diary and interview study of mCommerce shoppers who have already adopted the technology and shop on their mobile devices regularly. Our study explores typical mCommerce routines and behaviors along with issues of trust, given its long-term concern for eCommerce. The second is a diary and interview study of new and existing users of mobile payment services in North America. Participants used a variety of services, including Google Wallet, Amazon Payments, LevelUp, Square and company apps geared towards payments (e.g., Starbucks). Our results show that when it comes to shopping on mobile devices, people have few trust concerns. Yet when mobile devices are used for payments within physical stores, trust issues emerge along with pre-purchase anxiety and mental model challenges. We discuss these results and show the value in adapting and developing new trust mechanisms for mCommerce.

KEYWORDS

Electronic commerce, mobile commerce, mobile payment services, initial trust, soft trust, diary methods, trust mechanisms

1. INTRODUCTION

The act of shopping on mobile devices and using smartphones to pay for items in stores is increasingly being common and will likely continue to proliferate over the next few years. This includes using apps or web pages to shop for items on one's phone or tablet and even making payments in physical stores using near-field communications (e.g., Google Wallet), closed loop systems (e.g., Starbucks app), or card readers (e.g., Square). These activities all encompass *mobile Commerce* or *mCommerce* for short [30]. Over the years we have seen a large amount of research on eCommerce [9, 20, 24] with a particular focus on the trust concerns that people may experience and the ways that companies can circumvent such concerns [20]. This has been shown to be critical for user adoption [20]. There also exist studies that explore mobile payments. These have

looked at mobile payments in developing countries in Africa [12] as well as mobile payments in developed countries in Europe [21, 26] and Asia [15] to describe the usefulness of such services. While valuable, these studies focus on much earlier time periods and SMS-centric mobile payments, rather than smartphone-based payments, which are now readily available in North America. Thus, what the existing literature does not explore is the ways in which people now use an increasingly large variety of mobile devices (e.g., smartphones, tablets) for mobile shopping and buying as well as for the payment of items in physical stores.

The goal of our research was to explore how people are incorporating mCommerce into their everyday lives (or not) and how elements of trust were affecting this usage. Trust has historically been a notable barrier to eCommerce adoption [8, 20] and so we wondered what trust concerns people may have with current forms of mCommerce—namely mobile shopping and mobile payments. We set out to uncover potential trust concerns; how people mitigate such concerns, if at all; and, what trust models from eCommerce are relevant for understanding mCommerce behaviors, concerns, and design directions.

To explore this area, we conducted two studies of users' mCommerce activities. First, we conducted an exploratory diary and interview study of *shopping and purchasing on mobile devices* [10]. This included purchasing items using a mobile web browser or a company-specific app (e.g., Amazon's app, eBay's app). A common example was searching for and purchasing an app for one's smartphone using the Apple App Store or Google Play store. Our focus was on understanding user routines and, specifically, issues or moments related to trust (or a lack of) in their mCommerce activities. Our study predominantly focused on issues of "soft" trust (e.g., willingness to make a transaction, knowledge of companies) [9]; however, we also note a small number of issues related to "hard" trust (e.g., encryption) [9, 24]. In this article, we describe the ways in which trust concerns were largely mitigated during mobile shopping activities.

Second, we conducted a diary and interview study of existing and new *mobile payment users* in North America [11]. This included users who use their smartphone to buy items in physical stores. A common example was purchasing coffee at Starbucks using the Starbucks app on one's smartphone. We explored the experience from the perspective of those who had already adopted and integrated mobile payments in to their purchasing routines, as well as those who were using mobile payments for the first time. The former allowed us to understand those who have had relative success with mobile payments, while the latter allowed us to understand first impressions as well the people who may choose to not adopt the technology for longer term usage. We focused on uncovering the challenges and successes that users faced in using mobile payments. Again, this included a focus on potential trust concerns.

Both studies have been previously published as individual conference papers that articulate a broad range of user behaviors. Presenting these findings

together allows us to compare the two studies to show the contrast in results between different mCommerce activities. Here we narrow the focus and present findings specifically focused on trust and how this affects user experience. Our studies describe how users do *not* often have soft trust issues when they are shopping for and purchasing items *on* their mobile devices. This is because app marketplaces (e.g., the Apple App Store) lend brand protection, users' friends make shopping recommendations, and large brands dominate other mediums to provide a level of perceived trust for mobile shoppers. Yet when it comes to mobile payments for the purchase of items in *physical stores*, trust issues emerge because of the context of the situation and the ways in which people mitigate trust concerns when shopping on their mobile devices do not translate to these situations. Despite being in a physical store, users are concerned about data transmission, where money is 'stored,' and who views the payment activity (e.g., bystanders). These results point to the ways that existing trust mechanisms found in the literature need to be adapted to better reflect the concerns and issues people presently face with mCommerce activities. We describe such adaptations along with what we feel is a new form of trust development process, *routine-based trust*, which focuses on the incorporation of mCommerce activities within users recurring everyday activities.

First, we provide a comprehensive overview of trust frameworks when it comes to eCommerce and mCommerce. We return to key frameworks when we discuss our study results to show some still apply despite advancements in technology, while others are no longer relevant or take on new forms. Second, we describe our study on mobile shopping and purchasing and how people have *few trust concerns*. Third, we outline our study of mobile payment systems where *many trust concerns exist*. Fourth, we discuss our findings across both studies by focusing on design considerations for mCommerce applications that may emerge in the future.

2. RELATED WORK

2.1 ECOMMERCE AND TRUST

Online shopping, or eCommerce, has existed nearly as long as the Internet. With the introduction of technology as a mediator of commerce, new risks were introduced accompanied by a need to understand the new business environment. This understanding was particularly needed for trustworthiness, as early researchers concluded "trust, more than technology, drives the growth of eCommerce in all its forms" [8]. The field of human-computer interaction often borrows the definition of trust from business, which typically describes trust as being based on predictability, reliability, fairness, benevolence, and integrity [8, 22]. A common assumption is that consumers are vulnerable and likely to expose themselves to loss if they provide personal information during an online-purchase transaction [9]. Thus, one of the main focal points of eCommerce research is trust. Head and Hassanein [9] divide trust into two areas—*hard* and *soft*—and

differentiate between them in eCommerce. Hard trust is based on technical solutions and secure interactions with the belief that although data will be transmitted, encryption and firewalls will protect customer information [9]. In contrast, soft trust is centered on the privacy of personal information and vendors' quality of service [9]. Soft trust cannot normally be resolved through the application of back-end technology alone, such as new encryption methods or data transfer protocols [20], because it is based more on feelings of perceived trust.

Research has shown that there are several factors that make it difficult for online companies to develop trust compared to in-person stores [9]. First, online stores have lower barriers of entrance and exit compared to bricks and mortar stores. This means that consumers may not trust them to stay around for long periods of time. Second, consumers are not able to view a company's investment in buildings and personnel, which could further establish feelings of longevity. Third, consumers are unable to physically evaluate products in an online environment to the same extent that they can in an in-person store. Fourth, online stores often lack human elements and interaction, providing less of a chance that "trading partners" know each other [9].

In 1986, Zucker developed three types of trust-production mechanisms based on sociological and economic analysis of historical data from 1840 through to 1920. Luo [20] subsequently extended these mechanisms to describe three ways trust can be encouraged in eCommerce. First, *characteristic-based trust* relies on similarities between consumers and companies to establish trust (e.g., similar sex, ethnicity, or affiliations). Similar characteristics build similar cultural values, which in turn create the idea of shared moral and ethical habits in line with a member's social group [34]. Second, *process-based trust* refers to trust built through a history of past transactions [34]. This type of trust builds on reputation and therefore is dependent on customer satisfaction [20]. Luo [20] described process-based trust as a form of gift giving and sharing of information that is especially important in the business-to-business world (e.g., through white papers). Third, *institutional-based trust* is deliberately intended to build trust in the holder's ability, integrity, and intentions [34]. This is done through third-party guarantors such as universities with certified education, associations with professional-conduct standards, and medical and law licenses to guarantee ethical practice [20, 34]. McKnight et al. [22] elaborated on institutional-based trust by dividing it into two components: *structural insurance*, which encompasses the belief that structures such as regulations, promises, and legal resources are properly in place, and *situational normalcy*, which is the belief that the company is operating in a normal fashion.

Markedly, how people go about trusting online purchasing is a cost-benefit relationship; that is, if the perceived risk is low enough, people will purchase products online [20]. Keen [14] described risk as a natural accompaniment to trust, emphasizing that accompanying increased system networks comes a higher risk of infiltration of these systems. For Keen, eCommerce is a delicate "web of trust":

if any strand breaks, the entire web is compromised. Familiarity is also an important precondition for trust in eCommerce and trust is a prerequisite of social behaviors [8]. As risk increases, the importance of familiarity for trust also increases [8].

Research has shown that initial eCommerce trust is developed through reputation, site quality, and structural assurance [4, 22]. Trust in eCommerce research is often partitioned into two main stages: initial and direct experience [4, 6, 8, 14, 22]. Egger's model of eCommerce trust describes a trust process starting with pre-interactional filters [e.g., user psychology, pre-purchase knowledge, and transference], then interface properties and information content, and finally relationship management. McKnight et al. [22] and Gefen [8] described *trusting intentions* as the willingness of a consumer to engage in trusted transactions with a company, especially during the initial trust-development phase. Gefen [8] named this concept, *disposition to trust*, defined as a "general, i.e. not situation specific, inclination to display faith in humanity and to adopt a trusting stance toward other... this is the result of ongoing lifelong experiences and socialization."

2.2 MOBILE COMMERCE

mCommerce represents commerce transactions conducted on a mobile device [13]. The structural change to mobility allows for real-time access to the same information, resources, previously only available from a stationary desktop computer [13]. The importance of being able to access the Internet anywhere at any time is the cornerstone of much of the previous mCommerce research. Customers want continuous connection, increased speed of service, simplicity, convenience [13], ease of use [33], added value [1], cost effectiveness, and varying means for connecting [17]. There are noted shortcomings when comparing mobile commerce growth to its expectations [1, 7, 33]. Lack of adaption has been blamed on poor usability [33], social and cultural ideologies [19], and mobile-technology limitations [13]. Users also face time or location pressures when they are mobile [17, 25]. For example, users often put off making a purchase on their mobile phone because of time pressures or the need for social interactions with others (e.g., asking a partner before buying) [25].

We now turn more specifically to mobile payment services: the purchasing of items in physical stores where a smartphone acts as the payment source. Although there been no studies on mobile payment usage in North America with current smartphone technologies, there are some studies that focused on earlier versions of mobile payments in industrialized countries in Europe. First, Schierz et al. [27] tested mobile payment use in Germany based on the technology-adoption model. This model explains that the adoption of technologies is based on the perceived usefulness and perceived ease of use of the technology [2, 3].

Second, and the mobile payment study closest to ours in terms of its findings, Mallat [21] explored mobile payment usage in Finland more than ten years ago when mobile payments were based solely on SMS (direct billing) technology. Results showed that users found mobile payments faster and more convenient than cash; mobile payments were most compatible with small-value payments; and, complexities around the use of the systems along with a lack of large merchant acceptance were barriers to adoption [21]. Users also described issues with trust where they had feelings of “vagueness” and “perceived lack of control.” Users were also concerned about trust in network reliability and having their phone accessed if it was hacked, lost, or stolen [21]. Although valuable, this study focused on feature phones, not smartphones, from ten years ago. Technology and culture have radically changed in this time period.

Customer satisfaction in mCommerce has recently been explored within Business and Economic Journals. For example, in 2016, Duzevic et al. [4] investigated how loyalty is created through mCommerce applications in Croatia. Through a survey, they found that convenience, functionality, price, reliability, and visibility only make up 60% of customer satisfaction, and 38% of customer loyalty in mCommerce. Suggesting that there are other factors mCommerce Lee and Wong [17] took this work further, as they also investigated the impact convenience, reliability, price, visibility, and functionality has on satisfaction and loyalty in Malaysia. However, unlike Duzevic et al., the model they proposed included trust. Their work showed that trust was an influencer in customer satisfaction. While both these papers are focused on users outside of North America they show the growing realization of the importance of trust on the customer satisfaction and thus the user experience.

Mobile payments have also been studied in non-industrialized countries. Hinman and Matovu [12] investigated opportunities and challenges around mobile-based finances in rural Uganda. Their study found that users had a strong affinity to fixed assets, lacked access to capital, did not understand how mobile payments worked, and generally were confused by the mental model used to interact with the service [12].

2.3 MCOMMERCE TRUST

Trust frameworks have also been explored for mCommerce, however, this research space is limited with few empirical studies. First, in 2003, Siau and Shen [29] attempted to frame a possible trust-development cycle for mCommerce. They believed soft and hard trust were equally important in the medium. They felt initial trust could be formed by a mobile vendor through familiarity, reputation, information quality, third-party recognition, and attractive rewards. Continuous trust development, on the other hand, required additional acts such as open

communication and external auditing, in addition to interface design elements such as site quality and security controls.

Second, and more recently in 2005, research conducted by Cho et al. [2] considered some specific trust mechanisms and compared their effectiveness to aiding in trust and acceptance. Results showed that for eCommerce and mCommerce users, trust increases a user's intent to use. They also found that familiarity with a trustworthy e-vendor does not increase trust in either eCommerce or mCommerce; however, familiarity increases a user's perceived ease of use, which in turn, positively affects both eCommerce and mCommerce. The quantitative study results are less descriptive about why this is the case. Similarly, in 2011, Eze et al. [7] looked at Malaysian mobile-commerce usage. They were successful in proving personal innovation, subjection to norms, perceived cost, perceived trust, perceived ease of use, and perceived usefulness all positively affected intention to use, which in turn positively affects perceived usefulness. Out of all variables, perceived cost and subjective norms were top influencers; however, the researchers provide no insight as to why some variables ranked higher than others.

Kindberg et al. [16] conducted a controlled laboratory experiment in 2004 in which users were asked to rank, compare, contrast, and answer security questions based on five configurations of mobile payments. Generally, when ranking the systems, users justified choosing one system over the other by focusing on either a combination of or solely based on social convention, trust, or convenience. Users with social-convention reasoning felt some methods of payment eliminated the visibility of paying and thought others in the store might think they did not pay, and this made them uneasy. Some users also noted that they enjoyed human contact; however, they trusted the system to take proper payment over the human interaction. Users focused on convenience reported they liked bypassing the need for a human to respond. Unfamiliarity of the new payment system bred distrust, but the tangibility of having a payment device in sight increased trust [16].

In summary, the related work provides a backdrop for understanding trust and eCommerce activities. We also see initial explorations of mCommerce activities and the new challenges for trust frameworks. Our work builds on these studies to explore trust in mobile shopping and purchasing activities, followed by trust and other social challenges for the use of mobile payment systems. In both cases, we contribute studies of user behavior "in the wild" as opposed to a laboratory environment.

3. STUDY 1: SHOPPING ON MOBILE DEVICES

Our first study uses diaries and interviews to explore mobile device shopping and purchasing behaviors and routines, as well as issues of soft trust. We specifically explored shopping on devices that are easy to carry and take with a person (e.g., they are mobile), where they may have either continuous or intermittent Internet connectivity. Thus, our study focuses on shopping on smartphones, tablets, e-readers, and mobile music players (e.g., iPods) with shopping capabilities, but not on computers or laptops (despite some being portable). We felt the latter did not easily fall under the definition of mCommerce.

3.1 PARTICIPANTS

We recruited 17 adult participants (9 female) who were regular mobile device shoppers (e.g., purchased online at least once every two weeks). We chose this population because their shopping behaviors and trust issues were less likely to be a result of new user adoption or novelty. Our recruitment strategies included advertising in social media applications, to undergraduate classes, and via email forwarding as a form of snowball sampling. All participants but one was from Vancouver, BC, Canada – a major metropolitan city. Participants' ages ranged from 19 to 44 and occupations varied heavily (e.g., students, social workers, designers, salespeople, teachers, administrative assistants, marketers). Participants also ranged in terms of their main mobile device: eight people used an iPhone, three used an iPod, three used a Blackberry, two used an Android device, and one person used an iPad. In all cases but the iPad, the participant carried the device with them nearly all the time.

3.2 METHOD

Our study method was deliberately exploratory, despite there being existing knowledge of mobile device routines, eCommerce activities, and trust frameworks. We wanted to explore mCommerce without preconceived notions of what the activity “should” entail. Our study method consisted of two distinct stages.

1. Electronic Diary: We recognized that mobile device activities can take place at various times and places and it can be difficult to directly observe these activities as a result. For this reason, participants first kept an electronic diary of their mCommerce activities over a period of three weeks where we asked them to fill out an online form for each of their mCommerce activities. This included both

shopping (without purchasing) and buying. The diary form asked participants to describe their activity, any concerns about trust (where we purposely did not define 'trust'), and their location when the activity occurred. Participants received a daily reminder via email and SMS, encouraging them to visit the e-diary form and enter their mCommerce activity for the day. Participants were also asked to send in a diary entry even if they did not do any shopping activity that day in order to indicate this was the case. To aid in accessibility, participants were asked to install a shortcut on their computer and mobile devices to the diary webpage.

2. Semi-Structured Interview: Following the three-week diary period, we conducted a semi-structured interview with each participant. The goal of the interview was to expand on the understanding of the activities recorded in each participant's diary, to check the accuracy of entries, and allow participants to voice any other additional insight. Example questions included: what prompted you to perform the activity; what were you doing before/after the activity, were you familiar with the company you purchased or shopped from, did you have any trust concerns, etc. Participants were paid a total of \$40 for both study stages.

Both the diary entries and interviews took place over the summer months of 2011; thus, they did not span any major holidays known for 'excessive' shopping. As a result, our findings are focused on more 'normal' everyday shopping.

3.3 DATA COLLECTION AND ANALYSIS

In total, participants completed 161 diary entries that contained mCommerce activities. All participants had at least one activity and the average was 9.5 entries across the three-week span (median 9, range 1 to 20). All interviews were audio recorded in order to review interview data numerous times. We also kept handwritten or typed notes. We inductively analyzed all diary entries along with our interview notes using open, axial, and selective coding to draw out the main themes [31] and compare participants. For example, when coding the interview transcripts to learn why participants purchased or shopped during a particular incident, responses ended up receiving one of four codes based on the participants' reasoning: [sn] they had a specific need, [ip] the activity was done on impulse, [pr] peer recommendation, [ft] just looking to fill time, or [r] related to their routine. These codes were created organically as new data was discovered. Once we had coded all of the data through this open coding pass, we then studied and reflected on the codes to see their similarities and differences across participants. Following this, we grouped and categorized codes into larger themes and concepts as part of

axial coding. Finally, we analyzed the codes to see which themes were most relevant and salient to our investigation; this formed our selective coding stage. Next we outline our results focusing on the main themes found in our data.

3.4 RESULTS: SHOPPING BEHAVIORS AND TRUST

Participants exhibited a variety of shopping behaviors with their mobile devices. When shopping (without purchase), participants were looking for particular items at one or more stores or comparing prices of an item. Items included clothing, housing accessories, shoes, car insurance, cellphone accessories, toys, and pet products. Reasons for not purchasing included: a high price, the item or service was not what they were looking for in terms of location, quality, or they were just browsing for fun and nothing 'caught-their-eye.' Most shopping was done within apps created and published by specific stores (e.g., eBay, Amazon). To a much lesser extent, some participants would use their mobile device's web browser to shop on a particular company's website.

Participants also purchased a number of items on their mobile devices. A large portion of purchases (92%) included software downloads, including items purchased from smartphone app stores (e.g., Apple's App Store, Google Play). Participants also bought a variety of items that were not software including movie or sports tickets, food, jewelry, shoes, yoga classes, flowers, ebooks, books, and clothing. 17 participants logged in to a previously created account to make a purchase; this included using Amazon and eBay apps, along with apps made by social couponing sites and local food stores. The other 11 participants entered their credit card information from scratch into a web browser page to earn additional credit card points, or because the company did not have an app with recorded payment information. We saw greater than a 76% purchase rate for items under \$5. Only five of the 25 \$30-\$100 products were purchased or downloaded. Only two of the \$100-\$350 were purchased or downloaded. Additional results on the timing and frequency of purchases are reported elsewhere [10].

Overall, our data showed that participants had few trust concerns when shopping and making transactions on their mobile devices. This was surprising given the trust concerns people often have for eCommerce [20]. We explore the reasons for this next.

3.4.1 LITTLE RISK

First, many participants felt that most of their mCommerce activities presented little actual risk to them. Participants who in particular felt there was little

risk were not surprisingly those who: spent very little money, mostly only acquired free products or services, or simply shopped as opposed to purchased. For example, P2 and P4 both told us that they had no trust issues because they did not actually purchase anything. P9 elaborates with a very common reaction from participants who just shopped:

"I was just looking at prices and seeing product descriptions so I don't have trust issues associated with that." – P9

P5 similarly told us he had no trust concerns when downloading a podcast because *"it's free and no cost is involved."* Low cost items were also often regarded as low risk because of the cost of the service or product.

On the other hand, one participant did mention she had trust concerns when buying free or low cost items. P13 only downloaded free applications for her mobile device, but instead of seeing this as little risk she saw it as a potential invasion of privacy. The participant explains her concern:

"I briefly thought about how (the app) now knows about some of the types of music I listen to, after I played a song for the app and they offered me ringtones. Will they now try and market similar types of music/lifestyle products to me?" And during another free download purchase the participant mentions "(it) made me think if this information (is) being accessed and used for marketing." – P13

While seemingly mundane, the above findings show that when people think about 'trust' in their mCommerce activities, they mostly think about loss of money. Because the cost of many items (e.g., apps for their devices) is low or free, they do not feel trust is a concern. Yet there are certainly many other issues that could arise and pose trust issues for mobile shopping and purchasing such as the reveal or surreptitious use of personal information (e.g., credit card information), the tracking of one's browsing activities, the tracking of one's purchases, poor quality of service, etc. P13's comments begin down this path; however, this line of thinking was rare amongst participants.

When items were expensive, participants never mentioned a heightened level of concern in terms of trust. Instead, they would just comment on the cost being too expensive. One participant, who bought car insurance, a \$550 purchase, indicated she would have had no problem ordering it over her mobile device but the company would not allow her to do so. She had to migrate from shopping on her phone to purchasing on her computer.

3.4.2 PRODUCT AND STORE BRANDS

Aside from simply a lack of risk due to little money being exchanged, 'brand' played the most significant role in trust for mCommerce. By brand we are referring to the actual company that participants engaged with to shop or make purchases (e.g., the eBay app, the Macy's web page). Participants continually stressed their trust in these brands either as a marketplace app or the actual vendor. Only one participant recorded diary entries, which, excluding price comparison activity, had no past experience with the vendor.

"(the) Apple App store is an official app for Apple brand and since Apple is a famous brand so I have no problem trusting and purchasing online with them."
– P8

In cases where participants had negative feelings towards a brand, the company's app was never downloaded to the person's mobile device. Participants simply knew the companies before they would shop at their stores (via the store's app) on their mobile device.

Several participants commented that they repeatedly purchased from the same places and this history made them feel safer and lead to them trusting the company and their activities with it. When it came to first time shopping with a particular company, participants relied on other indicators to increase the level of trust they felt. These included the overarching approval process of many mCommerce applications and relying on the recommendations of others; we discuss these in the next two sections.

3.4.3 BRAND TRANSFER THROUGH THE 'APP' APPROVAL PROCESS

In addition to trust in store and product brands themselves, participants mentally transferred their trust from larger companies (e.g., Apple) that approved mCommerce applications to the applications themselves. That is, app marketplaces were highly successful in transferring trust from their well-known brands—Android App Market, Amazon's marketplace, Apple's iTunes, and the Apple App Store—to their affiliates and partners. For example, if participants were using an app on their mobile device for shopping, regardless of which company made the individual app, because the app had been approved through a larger trusted company (e.g., Apple), the trust the participant had with that company

transferred to the app itself. A similar phenomenon occurred for purchasing or downloading apps themselves. Because apps were approved by a larger, trusted company, apps themselves were considered to be trustworthy.

For example, many participants said that apps found in the Apple store were trustworthy because, as consumers, they felt they were protected by the Apple brand and the 'prescreening' that the company does before permitting an app to be present in the store.

"It was through iTunes so I didn't have any trust issues... I trust the iTunes brand and I believe they really check the quality in products before they release them ..." – P17

We also found that in some cases participants were not even conscious of the mental transfer of trust between brands in this way. For example, during some interviews, participants would first claim that they would not download an app without knowing the company who created it or offered it. However, in subsequent interview questions, they admitted to doing just that. This is in-line with Phelan et al.'s [27] findings around mobile usage, where users may express concern around privacy related to online data collection but in practice choose to accept the risk.

3.4.4 RECOMMENDATIONS FROM FRIENDS OR FAMILY MEMBERS

We also found that participants had few trust concerns because many of their shopping or purchasing activities were based on recommendations by close friends or family. For example, 9 of the 17 participants engaged in mCommerce activities that were initiated by a friend or family member's recommendation, either in person or via an electronic medium (e.g., email). Within these nine, four even engaged in a mCommerce activity directly through a social media platform (e.g., Twitter, Facebook).

The types of items and stores that people received recommendations on varied heavily. For example, P1 downloaded a sports team app for her mobile phone based on a friend's recommendation, P2 downloaded a recipe from a recipe site recommend by her partner, P9 shopped for racquets based on the recommendations of her friend, a tennis 'pro,' and P13 bought frozen yogurt based on a friend's recommendation. Perhaps the most self-aware of the influence that friends had on his shopping was P17 who said, *"I have a whole shopping network... me and my friends all use Groupon."*

Because of the social influence of others, interactions with particular vendors or products were deemed to be trustworthy, regardless of whether they actually were or not in fact. The sheer act of social recommendation elevated companies, brands, or items to a trustworthy status.

In most cases, social recommendations were just from close friends or family members, yet they did sometimes come from strangers where a person would rely on them if there was a large response from people:

"The seller has 100% positive feedback on eBay and I don't buy from sellers that (have) neutral or negative feedbacks" - P15

3.4.5 MISTRUST

In some cases, mistrust did arise but this was rare. Across all 161 diary entries, only 11 entries indicated there was a trust issue. The reasons for why the participants had trust issues often related to the previously discussed reasons for assuming trustworthiness. First, four diary entries discussed a lack of trust in the purchasing of a mobile device app because the app had a low rating as recommended by other users. In only one case did the participant continue on to downloading the app. Another participant commented, *"I decided not to download even the free version because the comments were all negative."* Together, this further suggests that even if a person doesn't receive advice or recommendations from people they know, if there is a large enough response, they will rely on the advice of strangers.

Second, four diary entries related to mistrust because of brand. Two diary entries by the same participant reflected instances where he simply did not trust a brand because of a lack of recent history with it. When asked if he had trust issues, he told us in the first case, *"yes, as I have not purchased on this site before,"* and, in the second case, *"yes because I haven't ordered flowers for a long time and I couldn't remember what website I had used before."* In addition to this, we saw two more diary entries where the brand (the company) was not trusted because of the company's location; one was located in Hong Kong and one was in England, which are both a long distance away from the participant.

Third, two diary entries related to hard trust concerns. One participant was concerned about a potential virus, while another was worried about the security of the wireless network they were on in a mall. Lastly, a small number of participants cited usability issues (1 entry) and the limited ability to physically evaluate a product (1 entry) as reasons to mistrust mCommerce activities.

Even though the frequency of the above occurrences is small, it further suggests the importance of the aforementioned reasons why people have few trust concerns for their mCommerce activities.

3.4.6 SUMMARY

In summary, our first study shows that people faced few trust concerns when shopping or purchasing items on their mobile devices. Such concerns were mitigated by a lack of large risk, trust in product or store brands, and recommendations from others. Yet we also recognize that our first study looked at a fairly established practice. For example, shopping on one's smartphone is often the first thing a person does when they buy a new phone because they want to download various apps. After that point, it is a recurring activity for many smartphone users. Given this, we were interested if users of newer mCommerce activities with fewer regular users may experience more concerns when using the technology. For this reason, we turned to a study of mobile payments, still in their infancy in North America, which is described next.

4. STUDY 2: MOBILE PAYMENTS

The goal of our second study was to understand how people used mobile payments in North America and the challenges they faced. By mobile payments, we are referring to payments for items in physical stores using a mobile device or money transfers between people. This contrasts the previous study which focused on buying items online. We explored this topic from the perspective of new and existing mobile payment users.

4.1 PARTICIPANTS

We recruited 21 participants (eleven female) through postings on online forums and word of mouth. Ages ranged from 21 to 49, with a median age of 27. All participants lived in major metropolitan cities in North America (Canada and the United States). Occupations of participants varied heavily, e.g., engineer, graphic designer, sales, student, web developer. Participants had average to expert technical abilities and all owned a smartphone. About half of the participants used an iPhone, while the other half used an Android device.

We purposely chose to investigate two groups of participants: existing mobile payment users and new mobile payment users. This allowed us to understand the experience from the perspective of those who have had relative success with mobile payments, leading to their long term adoption, as well as the

first impressions of new users who may or may not chose to adopt the technology for longer term usage. Based on their own descriptions, we classified eleven users as *existing users* and ten participants as *new users* who had never tried a mobile payment service prior to the study. The amount of experience that existing users had in using mobile payments varied between two weeks and four years with a median of six months. Existing users used mobile payments on average twice a week.

4.2 METHOD

Our study method varied depending on whether a participant was an existing or new user of mobile payment services.

METHOD 1: EXISTING USERS

Existing users participated in a semi-structured interview that focused on their past and current experiences with mobile payment systems. Interview questions were based on understanding the participant's specific instances of use and why they used the services the way they did. Sample questions included: What mobile payment services have you used? When was the first time you used a mobile payment service and why? When was the last item you purchased using a mobile payment and why did you choose this payment method over another? What time of day was the purchase made and why? Interviews usually lasted between thirty and sixty minutes.

METHOD 2: NEW USERS

After the data collection of Method 1 was complete, ten new users, who had not used mobile payments before were asked to complete an e-diary over a two-week period while trying out any mobile payment service(s) of their choosing. The diary method was chosen specifically to capture the user's experience in-the-moment over the first two weeks of use. During the two weeks, participants were asked to complete a minimum of four diary entries though we anticipated that some people may not complete this requirement if they simply found mobile payments too difficult to use or it did not meet their routines. A diary entry was required for every instance of purchasing that they attempted. The four diary entry minimum was chosen as four was the average number of completed transactions by existing users in Method 1 over a two week period.

The diary entry was a web form which had fields asking the participants for the following information: title of the activity, date, time and location of the purchase, if they had any trust concerns when completing this activity, why they used a mobile payment and not cash/credit/debit, a summary of the purchase, and their satisfaction level of the experience. Participants were told to complete the

diaries as soon as possible after the purchase. This could be done on their phones in the moment, or later in the evening when at home. Participants opted to do a range of behaviors for recording entries.

After participants completed the diary entry phase, they participated in a semi-structured interview. During the interview, which also took between thirty and sixty minutes, participants were asked to review each of their diary entries and expand and/or clarify their entries. After, they were asked questions about the overall experience.

Existing users did not complete diary entries as we were interested in their summative experiences across their entire experience of using mobile payments, rather than a small portion of time, which would have been captured by diaries.

Participants used a variety of mobile payment options. These fell into one of four categories based on the types of mobile payment methods available in North America:

1. **Closed Loop Mobile Payments** (e.g., Starbucks App): the consumer uses an app on their smartphone to pay, typically by scanning a barcode at the register (7 new users, 7 existing users).
2. **Carrier Billing** (e.g., Text2Pay): the consumer pays by text message and the charge is added to their phone bill (1 new user, 9 existing users).
3. **Card Readers** (e.g., Square): these solutions allow merchants to take payment via a card reader attached to a smartphone or tablet (2 new users, 2 existing users).
4. **Near-Field Communications** (e.g., Google Wallet): the consumer can pay at the point of sale by waving their phone in front of a terminal (0 new users, 3 existing users).

As can be seen, most users focused on closed loop and carrier billing payment options given that they are currently more widely available in North America. The skew of new users to closed loop payments (e.g., Starbucks app) speaks to what participants were comfortable using mobile payments for and the monetary value and potential risk during the start of their usage. Because our participants used a variety of mobile payment services, our study reveals behaviors across a range of mobile payment options rather than findings specifically on any one payment solution. Despite this diversity, our results are fairly homogenous around all of the mobile payment services that participants used. We also feel this allowed us to explore the mobile payment research space as a whole, rather than a targeted study of just one type of payment option.

4.3 DATA COLLECTION AND ANALYSIS

We collected audio recordings of all interviews, notes from the interviews, and users' diary text. Interview recordings were later transcribed. All data was analyzed using open, axial, and selective coding in a manner similar to the previous study. Each user group was first analyzed separately. We then reviewed the data from both groups together to compare and contrast experiences. Our coding revealed several main themes that relate to the success and challenges that our participants faced when using mobile payment services. For example, codes that emerged from this study around adoption included: [fr] friends, [eou] ease-of-use, and [gm] gamification. We also found several ways in which existing and new users differed. We outline these differences along with our main themes in our results.

4.4 RESULTS: PURCHASING ACTIVITIES AND CHALLENGES FOR USAGE

Existing users reported purchasing a wide range of products and services using mobile payments. This included coffee, clothes, sporting goods, electronics, furniture, and extra-curricular activities. These products ranged in price from a \$2 cup of coffee to several hundred dollars; however, the majority of items were between \$2 and \$50. Some participants also told us that they paid bills and made bank transfers to individuals using a mobile app. While this was not about purchasing items, it does fall in to the definition of mobile payment services.

During the two weeks, new users purchased coffee, and made bill payments and bank transfers to individuals. New users' product prices ranged from \$2 to ~\$150. Although we asked participants to complete four diary entries over the two weeks, participants completed an average of 2.3 entries. Three new users did not complete any transactions even though they tried or thought about paying but did not understand; we followed up on these instances in our interviews. Without these three outliers, the average number of diary entries / purchases was 3.2. This illustrates that purchasing with mobile payments was an activity that typically occurred a couple of times a week for the new users. Thus, it was not a habitual or routine activity, which is to be expected for new usage when a person is still establishing a routine.

Within these purchase activities and experiences, our findings revealed clear successes that participants had in terms of mobile payments creating positive purchasing experiences. These related to ease-of-use, usefulness, and elements of gamification [11]. In addition, we also saw clear challenges that mobile payments posed for participants. Our results focus on the latter as they suggest design directions for mCommerce and contrast the results from our previous study as it relates to trust.

4.4.1 NEW USERS' ROUTINES AND A LACK OF BENEFITS

Mobile payments worked best for users who had a routine for purchasing items. That is, they had a certain time and day that they purchased an item, and this behavior recurred. For new users, the value of routines for using mobile payments was still high. Yet not all had a purchasing routine that mapped well to using a mobile payment service. For this reason, three new users did not enjoy using mobile payments, while a total of four new users did not make purchases. For example, P19 explains how mobile payments did not fit his purchasing routines:

"The Starbucks one is nice, it sounds quite cool but I don't use-- I don't buy Starbucks often enough to use it." - P19, new user

This quote speaks to the fact that mobile payments are currently only available in a small number of instances and stores within North America. For example, people who use Starbucks can easily use mobile payments because Starbucks has a payment app. Yet people who drink coffee at another location that does not support mobile payments will not have the same opportunities to use the payment method. This suggests that, over time, if more stores adopt mobile payment services as a payment option, the practices of new users might be different. Until this point, new users may not see the point of using a store "once in a while" simply so they can use a mobile payment option; indeed, this is what our participants told us.

Many new users also told us that they did not see the benefits in using mobile payments instead of a credit card, despite understanding how to use mobile payment options. That is, the mobile payment service seemed to offer the same benefits as a credit card to them, e.g., payment without cash. Yet they were already able to do this with a debit or credit card. Some participants told us that they felt they would not use mobile payment services in the near future unless their routines changed.

"I think (I would maybe use mobile payments in the future) because it could become more popular and we are moving towards that, maybe when my friends and family start using it and when it becomes a norm." - P19, new user

This illustrates that people are often fairly engrained within their current payment methods. It suggests that unless there is a larger societal shift in payment options and usage that some people simply will not change their practices.

4.4.2 MENTAL MODEL DEVELOPMENT & USABILITY

Mental models often help shape behaviour and explain a person's thought process on how something works. Some participants within the new user group, described how they just could not understand how paying with their phone worked or how to start the process. For example, P16, a new user, explained during the interview that she had a complete lack of knowledge around what direction to proceed to even start the study. She said she did not know what apps to look for or download. As a technically engaged individual this was shocking for her. She told us:

"I didn't know, like when I agreed to do it, I didn't know what apps to download, I didn't even know what to look for." - P16, new user

Other users made specific comments around not having the "mental model" to see their smart phone as a payment source. P20, a new user, was surprised that payment over a phone was even possible. While P17, a new user told us "it never even occurred" to him to use his cell phone to make a purchase. For him the thought of doing something serious like making a payment on the same device he uses to make "stupid text messages" from seemed unheard of. In his mind, the mental model for what a cell phone does did not include paying for items.

Participants also complained about a lack of adequate feedback with mobile payment services. Many participants indicated they did not know how much they were being charged before or during the transaction. This was true for a number of payment methods (e.g., Starbucks app and Square). For example, P11, a new user, talks about the delay in being notified how much he spent at a local deli:

"A few minutes later you get a message on your phone saying you just used LevelUp and the amount was X so it's just for the split second when they punch in the number they put in and then they charge your phone (you don't know how much you are being charged)." - P11, new user

A common theme across mobile payment services was a lack of visual or audio indicators for feedback around transactional information. Users felt it was

unclear when a transaction went through as there was little indication, leaving them unsure if the transaction was complete. In addition to a lack of social cues from the employees, this led to participants being concerned that they might have been charged twice by the mobile payment system.

4.4.3 PRE-PURCHASING ANXIETY

A common trend throughout both user groups was pre-purchase anxiety. Before participants made a purchase, they often tried to get their phones ready and were nervous that the phone would not be ready to be scanned when it was their turn in line. They harbored anxiety that the phone would turn to screen saver mode, and then require a password to be entered, or the barcode would not be ready to be scanned. Participants told us that this could cause a longer wait for people in lines, confusing discussions with store clerks, feelings of inadequacy in not being able to know how to use the technology, or the need to switch to another payment form. For example, P12's diary had numerous entries on pre-purchase anxiety:

"I like making sure I have the screen ready -- that my screen does not go to sleep. It has more to do with my performance anxieties than the app or the interaction." - P12, new user

Overall, the amount of tension around using mobile payments was far greater than participants thought they would feel. Surprisingly, while these feelings did diminish over time, they were still mentioned by existing users.

4.4.4 TRUST CONCERNS

We found several trust concerns in relation to using mobile payments. These included concerns around access to information and fragmented payment solutions. First, four existing users reported having serious concerns about information access. They were worried that other people may be able to access their payment information or other data on their smartphones. For example, P10, an existing user, explained how one mobile payment service he used was tied to his email account. His email account was hacked, which he assumed compromised his financial data. As a result, P10 no longer used that particular service, but still uses other mobile payment services. P6, also an existing user, described a situation she had when using a pay-by-phone parking service for metered parking. She explained how the system was tied to her phone number when you call in to pay and that she had just recently had her phone number

changed. The system did not allow her to change her profile, which resulted in her having access to someone else's account. This, in turn, left her with the assumption that someone had access to her account too. She told us the situation was "worrisome."

Another existing user reported having trust concerns over the security of paying through a barcode displayed on his phone. Because of this, he and his sister did a test where he sent his sister a screenshot of the barcode and she displayed the picture of the barcode at the store to make a purchase. To both their surprise, the barcode scanned successfully at the store and his sister was able to purchase.

Both user groups had trust concerns around security of personal information that they entered over Wi-Fi or other networks. For example, P20 had extreme concerns around the contract he had to sign to use the Starbucks app, as well as little understanding towards how the process would work. He even was concerned that he might be giving the company access to all of the data on his phone.

Issues around access to information also occurred for the viewing of information in person. Some users had concerns about data on their screen being visible to outsiders. For example, P8, an existing user, told us, *"It has to do with money, it's kind of private, so then I try not to show anyone."* P16, a new user, told us that she was nervous entering her credit card information on a bus.

"I found (a payment app) which I could add (money) to with a credit card... so I added \$20 and paid with my card. I did it on the bus and I think that made me a little nervous, like, can anybody see me taking my card out?" - P16, new user

Second, some participants did not like to leave money or personal information untouched and not regularly used. As a result, they really disliked the idea of creating mobile payment service accounts for each vendor that they might use. Instead, they wanted just a single global account so they would not accidentally mishandle their money by, perhaps, forgetting about it in an account. They were also concerned that they may not be able to keep track of account charges across multiple account in cases of potential fraud. Participants specifically told us they needed to "touch" their money often (e.g., by spending small amounts with each mobile payment service) to ease trust concerns and overall fear of money loss.

For example, P17, a new user, mentioned how he had information saved in a PayPal account from years ago. He expressed concern about not regularly

using the account and felt uneasy about having his information just “languishing” there for years. This ultimately gave him a negative feeling towards PayPal. He mistrusted PayPal as a brand and the information that was stored with them.

Similarly, P19, a new user, also said he would not use a system for payment unless it was accepted at nearly all of the stores he frequented. He, too, disliked the idea of having money in numerous places and was concerned this would lead to a loss of money as it “just sits in an account somewhere.”

4.4.5 SUMMARY

In summary, our second study shows that several social challenges exist that make it difficult for new users to adopt mobile payment services. Those who do start to use them face challenges in doing so. These relate to issues around a lack of routine usage for the service, lack of a mental model for making payments using a smartphone, pre-purchase anxiety caused by not being familiar with a technology, and trust concerns around information access and fragmented payment solutions. Over time, issues such as pre-purchase anxiety and a lack of mental model may disappear if mobile payment usage becomes more prominent in North American society. Yet issues of trust may be harder to address. We discuss this more in the next section.

5. DISCUSSION

We now reflect on our research studies to compare our findings with past work and explore trust frameworks and design considerations for future products and mCommerce applications.

5.1 COMPARISON TO PRIOR STUDIES

As noted, past research has studied earlier forms of mCommerce, specifically focusing on the use of feature phones, as opposed to the smartphones and tablet-based usage that we investigated. Our research supports some of this literature, but also presents a different picture, given the advancement in technology and cultural behaviors. Past research on feature phones over ten years ago (in Finland) found that mobile payments were faster and more convenient than cash [21]; our findings show this is not always the case. People become concerned with pre-planning their payments when standing in-line at a store and this can lead to purchasing anxiety and sometimes transactions that take longer because of mobile device usability issues (e.g., a screensaver coming on

just before someone is about to pay with their phone) or user error because of anxiety. Like others [21], we too found that mobile payments were typically focused on small amounts, people sometimes felt a lack of control over their payment (e.g., not knowing if it 'went through' correctly), and some people were concerned about their accounts being hacked, lost or stolen. Thus, even though networks and data transmission are seemingly more reliable and secure today, people still face the same concerns. Research on user perceptions of mobile payments showed that people thought that others would not think they paid if they used a mobile device to do so [16]; we did not find this to be an issue. Thus, when actually faced with using a mobile device to pay in a public setting, people's perceived concern does not actually manifest itself in practice. Also, in-line with the Customer Satisfaction literature [4,17] our work supports the importance trust has within mCommerce and adds contextual examples.

5.2 TRUST MECHANISMS

A large portion of our studies focused on the ways in which trust concerns were mitigated during mCommerce activities or the reasons why they were not. In this section, we explore the topic of trust in more detail by reflecting back on Zucker's [34] three trust mechanisms—characteristic-based, process-based, and institutional-based trust—that have been used as a lens for studying and understanding trust issues in eCommerce. The user behaviors we uncovered speak predominantly to this theory. If we look at these mechanisms in relation to our findings from both studies, we see how some of them continue to play a significant role in establishing consumer trust. However, our studies revealed that the fulfillment of these mechanisms often took on a new form that was specific to mCommerce when compared to eCommerce or traditional retail shopping. We elaborate in the following subsections.

5.2.1 CHARACTERISTIC-BASED TRUST

Characteristic-based trust refers to trust that is developed through similarities between consumers and companies (e.g., similar gender, ethnicities, affiliations) [20, 34]. In an age of mobile shopping, devoid of much human contact (at least between company employees and consumers), one might think that it would be hard to establish trust in this way. Yet, as our first study's results showed, many participants engaged in mCommerce shopping activities that were initiated by a friend or family member's recommendation. Because of the social recommendation, people placed trust in a site, service, or product, regardless of whether or not it was trustful. Thus, having friends, family, or, to a lesser extent, social networks provide recommendations for shopping makes characteristic-based trust a key component for mCommerce trust.

In contrast, our second study saw people purchase items within stores that would most likely have contained shoppers and employees with similar characteristics as our participants. For example, participants using the Starbucks app to pay for items would have been in a store filled with other coffee drinkers of similar characteristics. Employees of the store would also likely be of a similar class and ethnicity (e.g., Canadian) as the participants. However, even still, characteristic-based trust did not seem to establish itself for those using mobile payments. Participants, in particular new users, were still concerned that their payments might not work properly or that their payment information may be accessed surreptitiously by others.

The difference in findings between the two mCommerce activities, mobile shopping (Study 1) and mobile payments (Study 2), is likely related to the benefit of the technology as well as the infancy of mobile payments. First, using a mobile payment service may offer a user only a small advantage over paying with a credit card. For example, one could receive additional rewards from the company (e.g., Starbucks stars) for using their payment app [11]. Second, mobile payments are still relatively new in North America and the trust concerns participants had may have been associated with this 'newness' and a lack of established comfort.

Thus, our results show that characteristic-based trust is still relevant in present day mCommerce activities, however, its form is somewhat different than previously proposed. When it comes to shopping on mobile devices, characteristic-based trust is not about similarities between consumers and companies. Instead, it is about similarities between consumers and family or friends who recommend sites or items to purchase. This does not extend to mobile payments though. In the case of purchasing items in a store with a mobile device, similarities between consumers and the now visible company staff do not always overcome concerns that people have for using mobile payments. The implication is that characteristic-based trust mechanisms need to be augmented with other trust mechanisms in order to relieve trust concerns with mobile payments. Designers could consider how to apply this idea to the creation of mobile apps that include purchasing and payment options. In the case of mobile shopping, it includes explorations of how apps might better connect family and friends for recommendations. For mobile payments in physical stores, it includes explorations of how apps might project a sense of characteristic-based trust through their design, or rely on other trust mechanisms to couple with characteristic-based trust.

5.2.2 PROCESS-BASED TRUST

For process-based trust—trust that is built through a history of past transactions [20, 34]—we saw in our first study that even though participants were experiencing a new medium for shopping (e.g., mobile shopping), they brought

notions of trust with them through their prior experiences with eCommerce and retail experiences. For example, they continued to shop with companies that were previously known to them in the non-mobile space, such as eBay, Amazon, etc. The implication is that designers should consider fully integrating their mobile commerce opportunities with existing commerce sites and interactions such that notions of trust will transfer. For example, a company that presents an eCommerce web presence should provide a similar mCommerce presence in look and feel where a person could easily migrate between the two.

Turning to our second study, we, again, see a contrast to the first study. Process-based trust did not circumvent all trust issues when it came to our study of mobile payments. Process-based trust appears to have had an effect on where our participants chose to try mobile payments, or, for experienced users, the locations where they continued to use mobile payments on a recurring basis. That is, process-based trust likely helped users feel comfortable enough to 'try out' mobile payment services and they did so at locations that were familiar to them, e.g., Starbucks. Some participants even established longer term recurring practices because of their history of past transactions at an establishment. Those people that did not have a history of transactions at locations that offered mobile payment services were the people who were reluctant to try out such services. This illustrates that process-based trust could play a critical role in enabling first time users to 'try out' mobile payment services. However, after the initial point of use, process-based trust is not necessarily going to lead to longer-term adoption and usage. Our studies reveal that such behavior and a mitigation of trust concerns is likely to come from what we term *routine-based trust*: the act of having mobile activities fit within one's regular routine activities, such that continued usage within one's normal everyday activities causes trust to develop over time. The implication is that mobile device apps should be designed to present the mental model that one *can* pay for items on their smartphone with changes to the user interface to alleviate concerns over pre-purchase anxiety.

5.2.3 INSTITUTIONAL-BASED TRUST

Institutional-based trust relates to trust that is established by presenting a public presence that is respected and shows integrity [34]. This is commonly done through third-party guarantors, membership in associations with professional codes of conduct, etc. [20, 34]. The definition of this type of trust mechanism did not historically include distribution models such as app marketplaces, yet our first study has shown that these distribution models have played the role of third party guarantors when it comes to mCommerce. That is, the (often stringent) approval processes (e.g., Apple's App Store) that mobile apps must go through before they are even placed in the hands of consumers acts as a guarantor of service or products acquired through it. This is regardless of whether or not such approval

processes actually do make companies more trustworthy with their apps or shopping services. For consumers, it doesn't matter; they simply assume so.

In terms of our second study on mobile payments, we see several trust issues related to institutional-based trust. First, brand awareness and trusted marketplaces were not enough to mitigate many users' trust concerns unlike the mobile shopping activities in our first study. Even though participants were using mobile payment services that were acquired using the same app marketplaces, trust was still an issue. Again, it is likely that the 'newness' of mobile payment services contributed to additional skepticism about the activity and its trustworthiness.

Second, we recognize that currently mobile payment systems do not offer the same institutional backing as one might find with a credit card company. For example, if fraudulent charges occur on a credit card, most credit card companies are quick to reverse such charges. In the case of mobile payment systems, such services may not exist or users do not know about them. This suggests new models for companies to provide institutional backing against fraud, or designs that highlight such backing, if it exists.

Third, the main difference between mobile shopping (Study 1) and mobile payments (Study 2) is the location of the activity. Mobile shopping can occur almost anywhere, while many mobile payments occur in a retail establishment where the mobile device is used for payment of physical goods in-person. Institutional-based trust could emerge then from the physical presence of the store and its presentation. However, again, this aspect did not stop participants from having trust concerns. This shows that unlike traditional shopping where an established physical presence (e.g., a physical store) creates trust between companies and consumers, when it comes to mobile payment services, the presence of the physical store is not enough to circumvent trust concerns. The implication is that companies should consider ways to alleviate such concerns by creating a stronger tie between their mobile payment systems and the manner in which they are presented in stores. For example, stores that directly advertise within them that people can pay using the store's mobile payment system may create a stronger mental tie in consumers' minds between the store and the payment system. This could make the payment application less of "just another app on one's mobile device" and more of "an extension of the store" on one's device.

5.3 CONSUMER VULNERABILITY

Head and Hassanein [9] outlined factors that make consumers vulnerable in eCommerce transactions. These include providing one's email address, shipping information, credit card numbers, etc. where these have historically

happened at the time of purchase. For example, a user must input detailed information in order to finalize a purchase on an eCommerce web site when using their computer. However, this does not transfer to mCommerce. As the results of both of our studies showed, nearly all purchases occurred through an app marketplace or phone app that collects purchase information ahead of time, prior to an actual purchase. For example, when making a purchase in the Apple App Store, payment information is entered when a user first creates an Apple account. Then, when consumers decide to purchase something through the App Store, they need only enter in an account password in order to make the purchase. Similarly, when making a mobile payment using the Starbucks app, all personal information is entered in ahead of time. This type of 'automatic' payment eliminates factors of perceived vulnerability.

However, what we found different between our two studies was in the concerns that emerged during data transmission. In the first study of mobile shopping, participants were not concerned about data transmission. But in our second study of mobile payments, they were. Again, this likely relates to the 'newness' of the mCommerce activity. Moreover, even though little private data was actually entered on the screen during the actual act of making a mobile payment, participants still reported concerns with strangers seeing one's smartphone screen. The implication is that designers should consider ways of obscuring mobile device screens from others who may be present and able to observe the act of making mobile payments (even if this is meant to simply comfort the user, rather than truly protect them). For example, a simple solution might involve selectively dimming portions of a mobile device's screen that might contain privacy-sensitive information, while other portions involving user interactions might stay illuminated.

Lastly, participants in our second study were also concerned about the fragmented nature of mobile payment solutions where one's money may reside in several places (e.g., PayPal, the Starbucks's App). This meant users could easily forget about their balance. The implication is that mobile payment designs should be focused around a centralized hub that manages all transactions and balances. Of course, this type of solution would require partnerships between companies, which may not be possible. Alternative solutions could look at providing better feedback to users of their balances (especially if they are untouched for a long time), or the ability to easily move money out of a mobile payment service if it is no longer being used.

5.5 LIMITATIONS

There are limitations in both studies that should be noted. Study 1 did not explore the routines and practices of new users. Participants were all periodic or regular shoppers; thus, we did not collect any data from people who were new to mobile shopping and purchasing, or even new to mobile devices. It is possible that such individuals would have different shopping behaviors and increased trust

concerns initially as they learn how to shop and buy on their mobile device. While not addressing all these limitations, the second study was specifically designed to include the new user's perspective and negate some of these limitations from Study 1.

Additionally, the diary or interview focus on mCommerce activities could have increased participants' shopping frequency; yet, this is likely not the case, as we did not discern high amounts of shopping activities in any of the studies. From a participant sampling standpoint, there are limitations around cultural selection. Participants who participated in the studies belonged to a specific class (middle), were individuals who responded to study postings, and were technology users who owned smartphones. Thus, the study did not capture data from people who might not own the technology that is needed for eCommerce. It also likely that we did not capture data from people of a lower class. Further, the sample sizes are limiting because they do not allow for statistical significance.

5.4 FUTURE WORK

The resulting contributions raise a number of new questions that could be explored in future research. For example, future research could look at new users and how they become familiar and develop frequent mCommerce behaviors. We feel this research would be further beneficial to understand the adoption process. Secondly, the present mobile payment environment is quite fragmented. Thus, there are many solutions in place that are not likely to be supported as mobile payment matures. Our mobile payment study compared all forms of mobile payments, while future research may be able to focus on one successful type of mobile payment (e.g., SMS or FNC). Thirdly, the mobile payment contributions within this work identified trust issues related specifically to usability concerns. Based on these findings, future research should look to closely investigate usability in mobile payments and compare it to other forms of eCommerce specifically focused around the goal of understanding user needs for usability. Finally, a quantitative study could gather a larger participant sample to understand the percentage breakdown of the different types of shoppers (e.g., spontaneous, habit or routine, and fixed time intervals) over a longer time period. This in turn could provide a deeper understanding of the current make-up of these users in the wild.

7. CONCLUSION

Our paper explored the mCommerce activities of mobile shopping and mobile payments. For mobile shopping activities (Study 1), we found that most participants had few trust concerns and this can be attributed to several factors that map at a high level to trust mechanisms established for eCommerce. That is,

most of the trust mechanisms/factors that we saw for mCommerce could be translated in some form to those established for eCommerce. However, in each case, mCommerce brought unique nuances in terms of how the trust mechanisms were being applied and thought about by users. In contrast, mobile payment activities (Study 2) saw increased trust concerns develop which related to hard trust concerns over data transmission, information access, and fragmented payment solutions. The trust mechanisms that were found to successfully alleviate trust concerns for mobile shopping did not circumvent them for mobile payments. Overall we feel this is likely because of the infancy of mobile payment services in North America. Consumers are still developing an understanding of how the technology works and in what ways they can rely on companies to provide trustful transactions and experiences. However, it also illustrates that mCommerce is not a uniform activity and user reactions and experiences when performing mCommerce activities will vary. This also suggests that context-specific trust mechanisms and frameworks may be needed to properly understand user behaviors within the area of mCommerce.

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