'Kabootar': Towards Informal, Trustworthy, and Community-Based FinTech for Marginalized Immigrants

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Financial technology (FinTech) platforms often exclude certain countries from their services due to global political conflicts. As a result, immigrants from these neglected countries struggle with transferring money to and from their homeland through formal mechanisms. Instead, they get involved in informal transnational transactions that, while flexible, are often risky and full of hassles. We looked into this issue through an online survey (n=127) and engaged with multiple stakeholders (n=16), including the Iranian immigrant community in Canada, to co-design an application called *'Kabootar'* that matches senders and receivers of money across borders. In this application, a sender-receiver pair is matched with a pertinent pair sending money in the opposite direction. By facilitating two intra-national transactions in local currencies instead of two relatively complicated inter-national transactions, the need for money to cross borders is eliminated while staying within the boundaries of the law. Our user study (n=13) revealed several tensions in users trusting such informal transnational transactions. This work contributes to CSCW, HCI, and social computing's growing scholarship in personalized and collaborative computing technologies by advocating for a novel design approach based on collaboration and informality and extends their scope to the domain of FinTech for politically marginalized communities.

CCS Concepts: • **Human-centered computing** → **HCI theory, concepts and models**.

Additional Key Words and Phrases: Designing for Informality, Financial Technologies, Trust in Computing

1 INTRODUCTION

In the last few decades, the rapid growth of technology has conquered many domains, including finance. The intersection of finance and technology (often referred to as financial technology or FinTech) offers a broad range of applications, from loans, insurance, mobile payments, and investing to products that facilitate domestic and international money transfers. Recent FinTech advancements have become highly pervasive, and their products are successfully dominating the

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Proc. ACM Hum.-Comput. Interact., Vol. 6, No. CSCW2, Article 384. Publication date: November 2022.

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stock market [44, 77, 82], local business and gig-economy [81, 88], as well as personal finance [38, 51, 84, 121, 154] in the Western world. However, most prominent international FinTech services in the *'developed'* regions exclude certain populations, especially immigrants from countries that have adversarial political and economic relationships with the country they have migrated to [62, 110]. In particular, countries such as Iran, Palestine, Sudan, and Cuba are often ruled out from the mainstream international FinTech services due to the existing hostile political climate [22, 24]. Therefore, the immigrants from these countries living abroad, especially in the West, face restrictive protocols while transacting money with their home country, which leads to their economic and political marginalization [110, 161].

Nonetheless, such marginalized communities still find alternative channels and establish *'custom settings'* to send and receive money to and from their home country. For example, the Iranian immigrant communities often use the help of *'Sarrafis'* (Iranian currency exchange shops) to transact money with Iran [128]. Such informal activities are often mistaken for illegal exercises by the formal authorities and academic researchers [115]. Despite the social and economic magnitude of this issue, only a few works have addressed informal international monetary transactions in the domain of Computer-Supported Cooperative Work (CSCW), Human-Computer Interaction (HCI), and social computing. Further, commercial FinTech applications to support the above-mentioned informal economies are non-existent. We address this gap in the literature by proposing a new design paradigm based on informality, collaboration, and user-centered design principles.

This project investigates the *'rerouted'* settings of transnational financial transactions for the Iranian immigrant community living in Toronto, Canada. These settings frequently include asking friends and acquaintances to carry money for the transactors and incurring high service fees. A recent work showed that the Iranian immigrants in Canada often bypass the bureaucratic procedures in their transactions by using various techniques, including carrying cash on their body when traveling as well as using multiple local debit cards at the *Point of Sale* (POS) devices to withdraw limited amounts of money from their local bank accounts [128]. We build on this work and the lived experience of the first author of this paper, who is also an Iranian immigrant currently residing in Canada. We investigate the following research questions:

> **RQ1:** *What factors shape the experiences of the Iranian immigrant community in transnational money transfers?*
> **RQ2:** *How should we design community-based financial applications that leverage offline community networks to provide trustworthy and reliable money transfer services?*

We address these questions through a study consisting of three phases: survey, co-design, and user study. To identify the factors shaping informal international money transactions carried out by the Iranian immigrant community in Canada (RQ1), we surveyed 127 people. Our findings from the survey showed that the participants often engaged with third-parties in informal transactions to transfer money to and from their home country. We also learned about their use of social media, familial and friendship ties in Canada and their home country, prior experience with transferring money abroad, as well as the social factors that help them trust another person with their money (e.g., level of education, religion).

To understand the challenges of feasible design solutions for close-knit immigrants communities (RQ2), the second phase of our study involved co-design sessions with 16 participants from diverse backgrounds, including Iranian immigrants residing in Canada. In these sessions, we used a variety of generative methods, such as brainstorming with the participants to arrive at a design solution that facilitates informal transactions for immigrants. By borrowing *'accountability'* from formal practices, together with *'trust'* and *'flexibility'* that come from informal spaces, the ultimate design emerged with the goal of bypassing the bureaucracy and restrictions while staying within the

boundaries of the law. Building on our findings and inspired by the existing practices of shared economy, we prototyped *'Kabootar'* (meaning pigeon or dove in Farsi). *Kabootar* is a matchmaking platform that brings together pairs of people with similar money transferring requests (based on countries of origin and destination, amount, etc.) in opposite directions. To test the practicability of *Kabootar* (RQ2), we engaged with 13 participants through a user study in the third phase. We found that the participants sought a set of identifiable and trustworthy information, including the location, profile picture, and other identity documents of the parties in the transaction, while many of them were reluctant to provide the same information due to their privacy concerns.

This paper makes a four-fold contribution to CSCW and related fields. First, we expand on the gray area of informality in the FinTech domain and argue for novel design approaches in this field. Second, building on the findings from the survey and co-design sessions, motivated by the existing informal and collaborative practices of the Iranian immigrant community in Canada, and by leveraging the existing offline connections within close-knit communities, we designed *Kabootar*, a matchmaking platform for international money transfers that pairs pertinent sender-receiver duos together. Third, based on the findings from the user study of *Kabootar*, we present the tensions between users' privacy and trust among stakeholders in informal transnational transactions. Finally, we position this work as a design paper and discuss how the insights from the *Kabootar* study contribute to the ongoing discourse on personalized and collaborative computing technologies and point to more practical and informal technologies for marginalized communities.

2 RELATED WORK

CSCW, HCI, and social computing have often been concerned with technology mediation in national policies and international politics. Examples include artificial intelligence tools and algorithms for justice assistance [67, 87, 162], data-driven applications used in healthcare policies and insurance-related tasks [66, 111], as well as social media interventions in national elections [47, 49] within the context of North America. However, the challenges of implementing technology design and policies become more complicated when the spaces in question span across multiple nations. Over time, the countries' policies evolve with their technological infrastructure engendering new challenges.

Remittance is defined as the "non-commercial transfer of money by a foreign worker, a member of a diaspora community, or a citizen with familial ties abroad, for household income in their home country or homeland" [18]. The amount of worldwide remittances is usually underestimated for various reasons, including the use of informal channels and ambiguity in the definition of migrants [45]. However, the World Bank has estimated the value of remittance flows worldwide to reach 726 billion U.S. dollars in 2022 [8]. This value has been on an upward trend in the past few years [140] and is comparable to the Gross Domestic Product (GDP) of wealthy countries, such as Switzerland (roughly 752 billion U.S. dollars in 2020) [113]. To further put the magnitude of this issue into perspective, it is important to highlight that the annual inflow remittance constitutes a significant percentage of the GDP of the recipient countries [53], given that most of them are among the low and middle-income countries [104].

With the growth of Fintech, a plethora of money transferring applications is becoming available every day. Examples include Venmo[26], Zelle[29], PayPal[21], and WorldRemit[27]. Despite the vast adoption of the innovative solutions provided by these companies, some countries remain absent from their list of services. For instance, Venmo and Zelle only operate within the U.S. [25, 28] and require the users to have a U.S. bank account [23, 29]. More globally-recognized applications such as PayPal and WorldRemit, on the other hand, are inclusive of most countries but still exclude many countries such as Iran, Palestine, Cuba, Sudan, Libya, Syria, and Myanmar from their services [22, 24]. As a result, the immigrants from the countries neglected by Fintech have no choice but to turn to informal services to fulfill their international money transfer needs [128].

The significance and impact of international money transfers by immigrants and the limitations imposed by politics and international regulations, pose the question of ways to support such communities, which motivated our design idea. Our research stands at the intersection of international politics, trust, and FinTech. This section will discuss some of the prominent literature that motivated our research questions.

2.1 Transnational Politics in CSCW and Related Domains

For more than a decade, researchers in CSCW and related fields have been concerned with transnationality [155]. Many of the earlier works focused on the use of technology beyond the bounds of a single country or culture, boundary crossings, as well as frictions and hybrid practices in developing and semi-developed countries [59, 97, 136, 159]. This body of literature suggests that technologies should be designed in correspondence with the demands of the market that engage with intercultural collaboration, mobility, and global business transactions [59, 102, 157]. Consequently, the ways technology has affected transnational individuals and communities through appropriations in culture, policy, and economy have also remained a major curiosity to many scholars [70, 89, 119, 159]. Many researchers have developed theories and technologies to support the sense-making of transnational humor in conversations [61, 92–94] and transactions of products and remittances from one country to another [31, 78, 85, 103, 114]. Another important domain of transnational politics can be found in the growing body of CSCW and HCI work on migration, refugees, and internally displaced populations [37, 74, 109, 129–133, 150]. This body of work primarily focuses on how people interact with the new environment of their destination after moving from their home countries.

Many works in this domain showed that when certain technologies are exported to countries other than their country of origin, they often conflict with the local culture of the recipient country [40, 119, 124, 139, 158]. Cross-cultural communication and Information and Communication Technology for Development (ICTD) researchers have addressed these issues by studying the users through various means such as ethnography and designing appropriate interventions [35, 46, 58, 91, 120, 160]. Such conflicts have frequently pushed the designers of technologies to develop novel solutions. For instance, Uber in Bangladesh introduced a cash payment option since many consumers and drivers were reportedly unfamiliar with electronic payment systems in the gig economy [70, 89]. While Uber updated its design according to local practices and policies, Bangladesh also adapted to the gig-economic culture, given that the activity of Uber and other ride-hailing services were initially deemed illegal according to local policies [70, 89]. Many similar works in CSCW and related fields also show that technology and transnational policies often influence each other [64, 83, 86, 100]. We extend this body of literature to FinTech and immigration in the case of marginalized immigrant communities banned from mainstream money transferring platforms.

2.2 Computing for Trust and Accountability

2.2.1 Trust and Familiarity in CSCW and Related Domains. Trust is integral to most social interactions; however, there is no universal definition of trust, with conceptualizations of trust depending on the context and disciplines. In the Computer-Supported Cooperative Work and related literature, trust has focused mainly on how actors deal with vulnerable situations [125]. A working definition of trust relevant to this paper is the belief about a person or system's trustworthiness emerging under conditions of unknown outcomes [71]. Trust is shaped by many factors, whereas familiarity, on the other hand, has been consistently identified as an essential antecedent to trust [65]. Given the radical differences between online and offline spaces, studies have also looked at how reduced cues, anonymity, and increased ability to control messaging shape trust in online spheres [107].

Recently, many informal and shared economy services in which digital platforms mediate peer-to-peer access to goods and services are becoming popular worldwide. For example, lodging marketplaces (e.g., Airbnb[9]), ride-sharing or carpooling applications (e.g., Carma Carpooling [14]), and rentable fashions (e.g., By Rotation [13]), have recently emerged as viable solutions in this realm. Other examples include community-driven applications, such as Bunz [12], which involve online social interactions and offline exchange of goods and services. Trust in both the application [152] and the community are integral to users' comfort in using these services. Ratings and reputation systems in shared-economy platforms have been found effective for building trust among users [90]. However, studies have also shown that beyond reputation systems, trust in the sharing economy is also shaped by an individual's disposition to trust a system or community [151]. Multiple works have studied the role of self-disclosure and perceived trustworthiness in such platforms [63, 98, 127, 153]. Another strand of work has studied the role of trust in helping with decision-making processes [127] and creating a sense of community [52]. Previous literature has also indicated that the required trust on such platforms is generated through community participation rather than a precursor to taking part [60]. Other works have emphasized the importance of "trust in the platform provider" in order to reinforce "trust in peers" in sharing platforms [108], meaning that users should first find the platform "trustworthy" before being able to trust the users of the platform.

This discussion relates to the growing body of work on privacy and security over digital platforms in the global south. Computers, mobile phones, and other digital devices are often shared among the friends and family members in many societies in the global south, engendering new kinds of privacy and security vulnerabilities, with trust playing a prominent role in mitigating such tensions [34–36, 41, 69, 75, 126, 135, 138]. Beyond the privacy questions over digital platforms, the tension between trust and privacy is also present in other marketplace settings, including the mobile phone repair markets [33, 55, 80]. Sultana et al.'s work in rural Bangladesh further shows how trust is an essential element of the rural social fabric, shaped by various religious and para-religious beliefs, and how it contributes to controlling the use of computing technologies [143–149]. These scholarly works show how trust plays a crucial role in shaping people's use of technologies in both formal and informal settings.

2.2.2 Trust and FinTech. Mobile money has a long history in CSCW and related literature. Covering this gigantic body of work is beyond the scope of this paper. The literature on mobile money often considers liquidity awareness and movement, financial tracking, multi-user dependencies, and transaction visibility as crucial factors for usability [118]. For example, Vines et al. engaged with the elderly population in the U.K. and reported that replacing their cheques with electronic transactions was expected to be more beneficial to them, while in practice, the systems lacked usability and explainability and further made the transactions challenging for the intended users [156]. Many works on mobile banking in the Global South show that low literate and illiterate people struggle with mobile banking because they do not know how their money is managed on digital platforms [73, 105, 106, 112]. This body of work points to the ongoing concerns regarding trust, privacy, and accountability in FinTech within CSCW and related literature. However, trust and accountability in FinTech in the context of informal transnational transactions are still understudied in these domains.

FinTech has offered its capability to provide effective and faster service to users in the banking and e-commerce sectors [38, 82, 121]. Risks and challenges associated with FinTech transactions have also been studied by scholars [30, 42, 154]. While these works have attempted to address the concerns at national levels, transnational financial transactions using FinTech are still understudied in the literature. Furthermore, the challenges faced by the immigrants whose home country has

adversarial political and economic relationships with their country of residence are still the least visible in this body of work. Only one recent study with the Iranian immigrant community in Canada has expanded on these challenges [128]. This study described the lack of availability of formal money transferring solutions for the Iranians residing in Canada, leading them to trust *Sarrafis* (Iranian currency exchange shops) to transfer money through informal methods. The literature mentioned above motivated us to solicit answers to our first research question: *RQ1: What factors shape the experiences of the marginalized immigrant communities (such as the Iranian community) in transnational money transfers?*

In the area of community-driven financial applications, Peer-to-peer lending (P2P) has been a prominent example in the literature. P2P is the practice of lending money to individuals or businesses that match lenders with borrowers. In recent years, these services have become widely available online. China, the front-runner of this industry in the past years, experienced the rise and fall of these platforms [72]. However, such platforms are still not capable of providing the users with enough protection, and as a result, their users are often subject to harassment by other users on the platform [95, 96, 122]. This body of literature informs us about the need to set regulations for users' behavior on the platform as a crucial factor for the success of informal FinTech platforms.

A few applications, namely Lumenwire[17], are currently operating to address the problems Iranian immigrants face in Canada to transfer money to their home country. These applications show real-time exchange rate charts where the prices are updated regularly. Nonetheless, these applications are still growing, and the takeaways from their work are yet to come. All of the above-mentioned work motivated us to pose our second research question: *RQ2: How should we design community-driven financial applications that leverage offline community networks to provide trustworthy and reliable money transfer services?*

2.2.3 Blockchain and FinTech.
A number of researchers have recommended utilizing the Blockchain technology to address users' security and privacy concerns regarding their information on FinTech platforms. This technology has currently attracted many experts and non-experts by creating heated markets. Blockchain is also advertised as a powerful tool for social good. Examples of this include IBM's project on "Revolutionizing the waste supply chain" [141] as well as the "Transacting values with values" project, led by the CCEG Blockchain UN, that "focuses on the transaction of intangible and non-financial values using a unique combination of Blockchain Technology and the Social Earnings Ratio" [15]. UNHCR has also started experimenting with the applications of blockchain in potential use cases such as providing digital identity for refugees and tracking attendance of school children in refugee camps [79]. However, none of these projects up until now have had significant turnarounds. These factors motivated us to integrate a blockchain-based alternative design in our prototype and evaluate it in our user study.

3 BACKGROUND AND MOTIVATION
This work builds on the political tension between Iran and the West and the impacts of sanctions on Iranian immigrants in maintaining ties with their home country. The reinstatement of sanctions by the United States on Iran as a result of the withdrawal from the JCPOA (Joint Comprehensive Plan of Action) or 'Iran deal' in 2018 led many American and European companies to limit their operations in Iran to avoid losing business with the United States [4]. In light of the imposed sanctions, mainly the U.S. trade embargo, major international postal services, including USPS [5], DHL [3], and Aramex [10], suspended their services to Iran. Further, restrictions on international financial transactions with Iran meant that international money transfers through banks and other formal institutions were no longer an option for Iranian citizens [137]. In the absence of formal

financial and courier services, among many other vital services that were cut off, the Iranian community had to fall back on alternative, more informal methods to address their needs.

Iranian money exchange shops (or "Sarrafi"s in Farsi) became a natural replacement for the banks and international online money transfer services in the financial sector. Rohanifar et al. investigated the international money transferring practices of the Iranian immigrants in Toronto, Canada [128]. Their findings shed light on the rather unusual and risky procedures this marginalized community endures for essential money transferring needs. They revealed that most Iranian immigrants use their local Iranian debit cards in the sarrafis to withdraw cash from their local bank accounts in Iran. They further elaborated on other informal methods of transferring money and found that such practices often entail financial loss, fear, uncertainty, and privacy breaches for the users.

Many creative solutions were brought to the fore in response to the need for courier services. For example, some private companies offered delivery services to and from Iran via third-party countries such as Dubai. However, the most popular solution emerged from the Iranian immigrant communities themselves. In November 2015, Telegram introduced 'Supergroups', groups that are optimized to host large online communities to support up to 5,000 members once a 'basic group' has reached its maximum capacity [1]. Later, this number increased to 200,000 members per group (as of the time of writing this paper) [6]. In May 2018, a basic group in Telegram named "Koolbar Canada" [2] was upgraded to a supergroup. The word Koolbar has cultural significance in Farsi and refers to a person who carries goods on their back, often across borders, to make money [19]. The group's vision was to facilitate the transfer of goods and documents between Canada and Iran with the lowest possible fees. The Koolbar group in Telegram hosts roughly 21,000 members at the time of writing this paper. The passengers who plan to travel to or From Iran post their brief itinerary (including the city of origin and destination, the date of their flight, and the type and amount of goods or documents they can carry with them) in a formatted message. Then, people looking to send packages or documents can browse through the posts and send a private message to the person who appears to be a good match for them. The two parties then negotiate and come to terms by privately messaging each other without involving a third person. This group is also infrequently used to transfer money, but the lack of money transferring posts makes this solution for sending money unreliable. Additionally, the sensitivity of money has led many people to share cash-related requests in more close-knit and trustable circles than in larger groups.

Despite the swiftness of this method and the familiarity of the platform for the users, which made Koolbar and similar groups a great solution at the beginning, some challenges manifested over time. To name a few, finding a desirable match among hundreds of posts every day is time-consuming and thus an unscalable solution in the long run. Further, the lack of accountability in transactions initiated through Telegram and not having sufficient indications to trust the users on the application proves that a dedicated platform could better cater to the needs of users. Recently, startups such as Chamedoon [16] have emerged to facilitate the match-finding process for shipping luggage, parcel, and documents between Iran and Canada [7]. However, there remains a challenge around trust, certainty, and security as most Iranians are still not comfortable using these services for money transactions, and even in those few cases, their transactions are of limited frequencies and limited amounts.

4 UNDERSTANDING INFORMAL TRANSNATIONAL MONETARY TRANSACTIONS

The first phase of our study solicited an answer to the research question: *RQ1: What factors shape the experiences of the Iranian immigrant community in transnational money transfers?* To this end, we conducted an anonymous online survey with people from immigrant communities residing in Canada to understand their experiences with international money transfers. This survey was

Phase 1 Survey	Total: 127 (Female: 71, Male: 54, Non-binary: 1)		
	Age Range	**Education**	**Income (CAD)**
	18-20: 3	Highschool: 12	Below 25K: 57
	20-29: 80	Undergraduate: 50	25K-50K: 34
	30-39: 32	Masters: 56	50K-100K: 20
	40-49: 8	Professional: 1	100K-150K: 6
	50+: 4	Doctorate: 8	150K+: 1
Phase 2 Co-Design	Total: 16 (Female: 4, Male: 12)		
	Age Range	**Education**	**Income (CAD)**
	18-20: 0	HighSchool: 0	Below 25K: 3
	20-29: 8	Undergraduate: 7	25K-50K: 3
	30-39: 4	Masters: 6	50K-100K: 4
	40-49: 2	Professional: 0	100K-150K: 4
	50+: 2	Doctorate: 3	150K+: 3
Phase 3 User Study	Total: 13 (Female: 7, Male: 6)		
	Age Range	**Education**	**Income (CAD)**
	18-20: 2	Highschool: 3	Below 25K: 2
	20-29: 3	Undergraduate: 3	25K-50K: 3
	30-39: 2	Masters: 5	50K-100K: 2
	40-49: 3	Professional: 0	100K-150K: 0
	50+: 3	Doctorate: 2	150K+: 1

Table 1. Summary of Demographic Information of Participants.
*The "Prefer not to Answer" responses have been omitted

reviewed and approved by the authors' institution. The following section provides details about the survey and our findings from it.

4.1 Method: Survey

The objective of conducting the survey was to get an initial understanding of inducing and maintaining trust within informal online communities and gauging the feasibility of community-based money transferring applications. In the survey, we asked questions about the participants'. In the survey, we asked questions about the participants' demographic information, the existence of familial and friendship ties in Canada and their home country, social media use, experience with international money transfers, as well as social factors that influenced them to trust another person with their money or be trusted by others to borrow money from them. The survey was hosted on Google Forms for ease of use and familiarity. It took the participants approximately 15-20 minutes to complete the survey. The participants were allowed to leave the survey at any time without any further consequences just by closing the survey window in their browser.

4.1.1 Participants Recruitment. We distributed the survey among friends, colleagues, and family members who were eligible to participate in this part of our study. The eligibility factors to participate in the survey were: (a) being 18 years or older, (b) being a citizen of a country other than Canada (including dual Canadian citizens), and (c) currently living in Canada. We then used the snowball sampling research method, where we asked each primary participant to share the survey in their circles.

   We also made flyers and advertised them around different common areas at the University of Toronto St. George campus. In order to reduce the biases associated with the snowball sampling and increase the diversity among our participants, we also shared the questionnaire on various social

media to increase exposure. These media included immigrant community groups on Facebook, Canadian SampleSize subreddits, and Facebook pages where research-related opportunities and studies were posted. A total of 127 participants (female 71, male 54, non-binary 1) from all over Canada responded to our survey. See Table-1 for their demographic and other details.

4.1.2 Data Collection and Analysis. All the responses from Google Forms were retrieved as Comma Separated Value (CSV) files. We began analyzing the data by cleaning it first. This process included renaming the long column names and unifying naming conventions, as well as removing unnecessary columns such as the timestamp of responses. Then, we generated demographic charts and frequency tables to get a general idea about the distribution of data and their skewness. For this purpose, we used R language and Python in the Jupyter notebook.

4.2 Findings from Survey

The findings from the survey pointed us towards compelling factors that play a role in informal transactions within immigrant communities.

First, the most expected outcome was that the respondents were more likely to lend money to people they personally know (59%) than any other group, and this likelihood decreased the further or weaker their connection got to them. For example, the probability of lending money to a second-degree connection (e.g., a friend of a friend or family member) decreased to 40%, which is a drastic decline compared to the first trusted group. (see fig-1)

Second, contrary to our initial hypothesis, having common social factors such as nationality, hometown, alma mater, or profession did not make a significant difference in trusting a stranger with money, as most respondents were neutral (40%) or very unlikely (31%) to lend money to an unfamiliar person that they shared these commonalities with. To our surprise, most participants were neutral towards religious (both practicing the same or a different religion) or non-religious people they did not know (63%) or were very unlikely (22%) to lend money to them.

Third, comparative factors in social status such as education and job ranking proved more significant than we speculated prior to conducting the survey. For instance, participants were more likely to trust a stranger with higher or better quality education than them (24%) compared to a similar person with less education. Similarly, the respondents' likelihood of trusting a person who works in a reputable workplace was substantially higher (54%) than identical strangers employed in less-renowned workplaces.

Fourth, the survey shed light on "sanctions" or "punishments" that the respondents saw fit in the hypothetical case that the lendee failed to return their money on time. The majority of the participants chose to give the delayed lendee the benefit of the doubt and opted to remind them about the debt and give them more time to pay them back (70.1%), whereas fewer participants were inclined towards monetary consequences by charging them interest (40.9%). Lastly, asking for a mutual connection to mediate was another popular choice (58.3%) which showed how the "social aspect" of informal transactions often overrides the prior agreements between the parties involved in an informal transaction. It is worth noting that the participants' choice of sanctions was not mutually exclusive, and they had the option to choose more than one method of punishment or propose their own.

The findings from the survey informed us about the influencing factors in informal money transactions among immigrant communities. However, several important questions regarding specific cultural nuances adopted workarounds, and design implications of our findings remained unanswered. Given the sensitivity of our research around the issues of money and immigration, we decided to employ a User-Centered Design (UCD) approach in our study. To this end, we augmented the findings from our chosen investigative method (i.e., survey) with a generative one
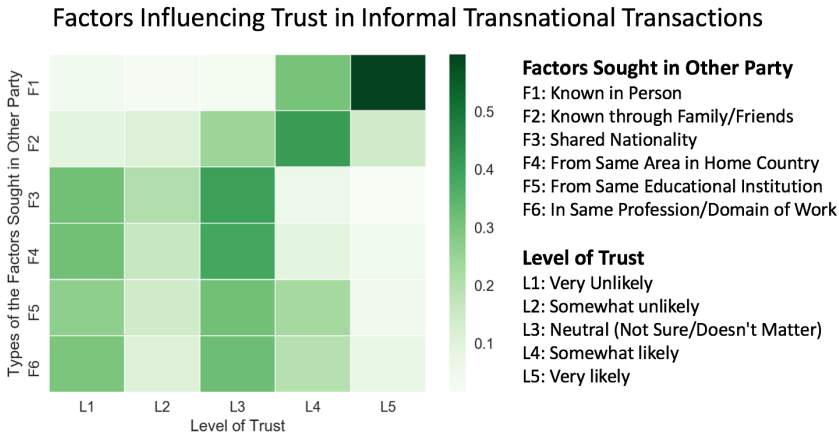
Fig. 1. Findings from the survey show how different social factors influence trust for lending money.

(e.g., brainstorming sessions) to further enrich our understanding of users' needs and attain solid design decisions.

5 CO-DESIGNING SOLUTIONS AND PROTOTYPING *KABOOTAR*

The second phase of the study solicited an answer to the research question: *RQ2: How should we design usable FinTech for close-knit immigrant communities who frequently engage in informal transnational monetary transactions?* In order to verify our findings from the survey and gain a deeper understanding of the experiences of marginalized immigrant communities with international money transfers, as well as find design implications, we conducted 23 co-design sessions with n=16 stakeholders, including eight members of the Iranian immigrant community residing in Toronto, UI/UX designers, software engineers, and academicians in Canada. Later, we designed a prototype based on their feedback. The sessions were conducted in both Farsi, the native language of the participants and the first author, as well as English. This part of the research was also reviewed and approved by the authors' institution. The following subsections provide details about the co-design sessions and the findings from them, as well as the details of the prototype that we designed.

5.1 Method: Co-design Using Storyboard

In order to deepen our understanding of how Iranian immigrants imagine a possible design solution to support their informal transnational monetary transactions, we followed a design thinking process. After empathizing and defining, we engaged with them through co-design sessions for the ideation phase. We had both one-on-one meetings and group discussions through in-person and video-call sessions. During the sessions, we first explained the scope of the problem, the goals of our work, and our understandings based on our experience and survey results. Then, we employed several techniques during the ideation phase with the participants, including brainstorming, creative problem-solving with six thinking hats, storyboarding, and mind mapping. We iterated and re-iterated on the initial idea and created several wireframes and paper prototypes until we unanimously reached an acceptable design solution for the first iteration of the high fidelity prototype.

5.1.1 Participant Recruitment. We first contacted the participants who had previously shown interest in participating in the future phases of our study. A total of eight participants agreed to rejoin us. We then recruited eight additional participants for co-design sessions. We selected people
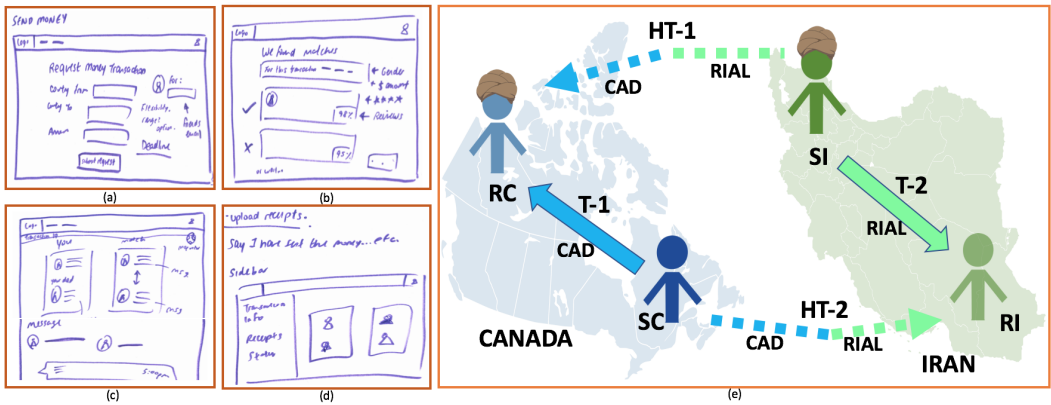
Fig. 2. Examples of storyboards generated during co-design sessions (a-d): (a) The submit request page, (b) The suggested matches overview page , (c) The transaction overview page with messaging function, and (d) The receipt acknowledgement function. (e) The basic idea of *Kabootar* as a possible design solution.

from different backgrounds and specialties by reaching out to friends, family members, colleagues, and international students in our institution that were knowledgeable about technology, UI/UX, economics, or had experience in transacting money to and from their home country.

5.1.2 Data Collection and Analysis. We conducted a total of 23 co-design sessions (16 one-on-one and seven group sessions). The group discussions included the participants from the one-on-one meetings. None of the sessions in this phase were audio or video recorded. However, we captured photos of all the storyboards and sketches. We also took notes of the discussions and opinions of the participants. The data collected from this phase includes more than 80 photos and 120 pages of field notes.

We then performed a thematic analysis on our detailed notes [50, 142]. While open coding [142], two of the authors independently read through the transcripts carefully and allowed codes to develop. Later they shared their codes with each other. A total of 24 codes spontaneously developed during the first round of the coding. Then we clustered related codes into themes after a few iterations. Some of the themes seemed recurring, for example, trust, privacy, local currency, exchange rate, and legal fairness. These themes influenced the organization of our finding section presented below.

5.2 Findings from the Co-design Sessions

During the co-design sessions, participants shared their challenges with transferring money to and from their home country and their existing workarounds to overcome these hurdles. We used a variety of ideation methods such as brainstorming to develop potential design solutions. We discuss our findings below:

5.2.1 Transferring Money via Sarrafis and Acquaintances. The participants mentioned that they often turn to third-parties to conduct informal transactions. One of the most prominent ways of transferring money overseas is through the *'Sarrafis'*. The participants confirmed the findings from a recent work about using Iranian Point of Sales (POS) devices to withdraw money from local Iranian bank accounts [128]. Although such transactions technically do not violate any local laws in Canada, withdrawing money through this method is often challenging. Some challenges include the exchange rate volatility between the Canadian Dollar (CAD) and Iranian Rial (IRR),

not providing the customers with any formal receipts, among other frauds that are common with cash-based transactions.

Another type of informal transaction involved searching for friends, family members, and other trusted people looking to exchange their Canadian currency for Iranian currency or vice versa. In many cases, the participants were referred to second or third-degree connections seeking to carry out a similar transaction in the opposite direction. For example, suppose one person wants to travel to Iran and needs local Iranian currency for their trip. Now assume that a friend of their friend needs a roughly similar amount of money from their savings in Iran to spend in Canada. In this case, if these two people are referred to each other through their mutual connection, they can agree on an exchange rate and transfer money in Canadian and Iranian local currency to each other's corresponding local accounts without having to incur additional fees, going to the Sarrafis, or spending unnecessary time. Our participants mentioned that while these types of transactions are more favourable to them, it is difficult to find trustworthy people who have similar needs at the same time as them. These informal transactions also come with their unique challenges, like delayed payments by the other party.

5.2.2 Concerns to be Addressed in Design. Most of our participants preferred to transfer money through their network to avoid incurring extra fees and save time and energy when transferring money overseas. All participants suggested building on this idea for a potential design solution. Examples of related storyboards are shown in fig-2(a-d).

Using sketches and storyboards, we discovered several design challenges. First, finding a matching person (or pair of people) with similar requests in the same time frame was found to be a significant challenge. Further, the issue of having mechanisms in place for holding a match accountable in an informal transaction was raised. During the group discussions, many participants brought up an Iranian online group named *'Koolbar'*, on the Telegram messaging application as an excellent example of an informal platform that has attempted to address these issues. This supergroup hosts more than 20,000 members and is commonly used to find passengers flying to and from Iran to carry parcels. The *'Koolbar'* group was originally created in response to the international embargos imposed on Iran that limited the services of major couriers [3, 5, 10], but has also been occasionally used as a match-finding platform for money exchange requests. The 'admins' of the *'Koolbar'* group are known to mediate between the members and provide a degree of accountability in a purely informal setting. By drawing this comparison, our participants imagined a platform that supports a higher degree of **accountability** for its users.

Second, many participants proposed a mechanism to find a fair exchange rate in the design solution. Some of them reported that they had to accept less favourable exchange rates due to the urgency of their money transfer needs. Others recalled Sarrafis changing their mind about the agreed-upon rate halfway through the transaction. These reports pointed to a need for **fairness and trustworthiness** in designing an informal money transferring platform.

Third, concerns about the legal consequences of repeated cash-based transactions were raised during the co-design sessions. Participants were worried about banks asking for proof of legitimacy for their funds when they receive cash from Sarrafis, especially since there is no formal paper trail involved in these transactions and the Sarrafis only provide cash. Thus **abiding by local laws** emerged as another important issue to be addressed in the design.

5.2.3 Expectations from Possible Design Solutions. Based on our findings from the co-design sessions, we concluded that our participants could benefit from a technology-based social platform to host their existing practices of informal transactions with the following qualities:
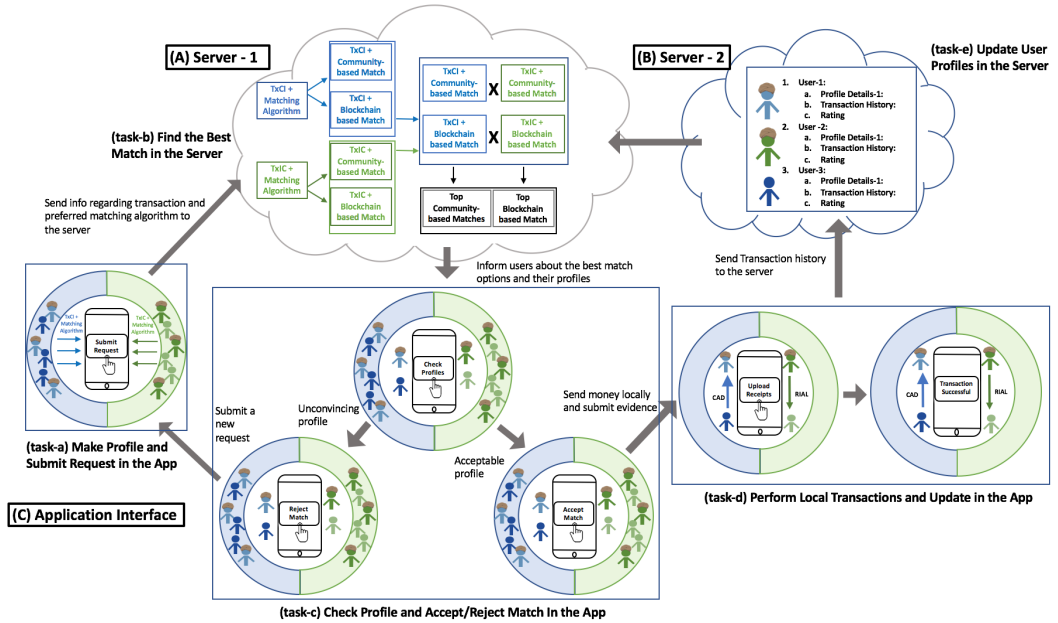
Fig. 3. Components and workflow diagram of *Kabootar* prototype.

(a) Accountability and Trustworthiness: The participants expect the new platform to offer a tracking mechanism to monitor each step of the transactions. This quality helps them build trust towards the platform and its users and facilitates their account keeping.

(b) Fairness in Exchange Rates: The participants expect more transparency and fairness regarding exchange rates to better cope with fluctuations and make more informed decisions.

(c) Legal Transparency: The participants expect the new platform to comply with the local laws and protect them against false accusations of money laundering or tax evasions. Thus, it is essential for the platform to employ a mechanism for monitoring and tracing fraudulent activities.

By the end of the co-design sessions, the participants were optimistic about a design solution that addressed their reported concerns and incorporated the qualities they deemed necessary in a platform that financially marginalized immigrants could benefit from.

5.3 Designing Kabootar

The co-design sessions led us to several possible design solutions. We chose the most feasible one and, together with the participants, developed the idea of an online platform to facilitate international money transfers. In this hypothesized application (see fig-2(e)), we imagined a pair, consisting of a sender in Iran (SI) and a receiver in Canada (RC), to submit a request for a hypothetical transaction (HT-1) during which SI sends money in Iranian currency, and RC receives it in Canadian currency. The platform then suggests a matching pair, consisting of a sender in Canada (SC) and a receiver in Iran (RI), who want to transfer an equivalent amount of money but in the opposite direction. This second pair wants to send Canadian currency, and receive it in Iranian currency through another hypothetical transaction (HT-2). Once the two pairs agree to be in a transaction,

SC sends the agreed-upon amount of money to RC in Canadian currency (T-1), and SI sends the same amount in Iranian currency to RI (T-2). Thus, two local transactions, T-1 and T-2 would replace the two international transactions, HT-1 and HT-2, without any money crossing the border.

By drawing on this core idea, we prototyped *Kabootar*, a platform to facilitate international money transfers, especially for immigrants and refugees. In Farsi, the word *Kabootar* translates to pigeon or dove. The reason behind choosing this name is the analogy between the carrier pigeons formerly used to relay messages or transfer money to what our platform aims to deliver. Doves also represent peace and freedom, which our platform intends to bring to the users who are marginalized by global politics and economic policies.

5.3.1   Design Goals. We designed and prototyped Kabootar with the following goals in mind:

> **G1: Creating a trustworthy, fair, and on-demand online platform for international money transfers.** The main problem of the Iranian immigrants we interviewed was the lack of access to online applications to remit money with accurate and fair rates, which urged us to set the primary design goal of our tool to deliver these qualities.
>
> **G2: Finding the best possible matches (based on relevant criteria) in the shortest time.** Our participants were open to trading with people from their community but struggled to find peers who wanted to send or receive similar amounts of money within their intended time frame. So we set our second goal to provide a service that would effectively cater to this need.
>
> **G3: Exporting the existing offline communities to a social platform and making connections based on trust and reputation.** We noticed that in the offline world, new connections and communities form through transactions with friends of friends, family, colleagues, and acquaintances who share the goal of sending/receiving money to/from a specific country. We wanted to maintain the existing connections and bring them to the online world while facilitating building new connections through trades.
>
> **G4: Providing a mechanism to ensure the authenticity of transactions and punishing the parties at fault.** We wanted to mitigate the classic problems of authenticating transactions and preventing fraudulent activities using responsive solutions emerging from the communities themselves.

Building on these goals, we designed the components and workflows of *Kabootar as* discussed below:

5.3.2   Workflow of Kabootar. There are five tasks which are needed to be performed to complete a successful transaction on *Kabootar*: (a) create a profile and submit a request in the application, (b) find the best match on the server, (c) check profile and accept/reject the match in the application, (d) perform local transactions and update the application, and (e) update user profiles on the server. To support this workflow, the platform includes the following core components: (A) Server-1,which handles all the transaction requests, (B) Server-2, which maintains the database of users; and (C) Application Interface for the users (see fig-3). We discuss the tasks and associated components below:

(Task-a) Creating a Profile and Submitting a Request in the Application: The users interact with the application interface to create a profile and provide personal details such as profile picture, level of education, information about their employment, and location. All of this information is sent to Server-2, which maintains a database of all the users with their transaction history. Upon profile completion, the users can submit transaction requests using their preferred method (i.e., social or Blockchain-based) in the application. The transaction requests from Canada to Iran are labeled as TxCI, and the transaction requests from Iran to Canada are labeled as TxIC.

(Task-b) Finding the Best Match on the Server: The application receives the transaction request and sends them to Server-1. Server-1 searches through all the requests in the opposite direction (e.g., by looking up the list of TxIC for any given TxCI and vice-versa) and finds the best match. Once a potential match is found, it retrieves the user profiles associated with the matching transaction requests and sends them to the user who requested the transaction.

(Task-c) Checking Profiles and Accepting/rejecting Matches in the Application: Upon receiving information about potential matches on their end in the application, the users can check the profile of the suggested matches. The platform allows the users to resubmit the same request if the user rejects the suggested matches.

(Task-d) Performing Local Transactions and Updating the Application: Once both parties agree to participate in a transaction, they share the details about their equivalent local transactions through the in-app messaging system and view their actions on the platform. Upon starting this task, the users get a window of 72 hrs (suggested by the participants in the co-design sessions) to complete the local transactions and upload corresponding receipts in the application.

(Task-e) Rating and Updating User Profiles on the Server: Once both local transactions are completed, the users can rate each other in the application. These ratings and the transaction history are updated on the users' profiles on server-2.

We designed a high-fidelity clickable and interactive prototype of *Kabootar* using Framer [20]. After each step, the co-design participants tested the prototype and revised it based on their feedback before the next prototype was developed. The final version of the prototype (see fig-4) was used for the user study.

6 USER STUDY OF *KABOOTAR*

This phase sought answer to the research question: *RQ2: How should we design community-based financial applications that leverage offline community networks to provide trustworthy and reliable money transfer services?* We conducted a user study of *Kabootar* with 13 Iranian immigrants in Toronto, including two participants from the co-design sessions. The semi-structured interviews uncovered opportunities to improve our design and learn more about the factors that help users trust their peers on the platform. The ethical board of authors' institution reviewed and approved this part of the work. The methodological details and findings are presented below.

6.1 Method: Interview

We engaged with the participants through one-on-one semi-structured interviews. Due to COVID-19 restrictions on public gathering, the sessions took place on Zoom video conferencing software. The sessions were conducted in Farsi, the native language of the participants and the first author. The researcher started the sessions by introducing herself and going over the objectives of the study. Then she explained the study process and asked for consent to record voice and screen prior to start recording. Upon obtaining consent, a pre-study survey link (Google Form) was shared with the participants. The survey asked about the participants' demographic information and their prior experiences with international money transfers. The researcher then shared her computer screen with the participants and displayed the *Kabootar* prototype on Framer. After briefly describing the prototype, she gave remote control to the participants and asked them to complete four major tasks. She requested them to think out loud as they interacted with the prototype. We used a mix of exploratory (asking participants to give opinions and express emotional impressions about ideas and concepts), assessment (evaluating the general functionality and user's satisfaction with the prototype and how well they are able to use it), and comparative testing (comparing between different methods of sending money in the application). In the end, we asked the participants about their overall experience with *Kabootar*, and sought their feedback to further improve the platform.
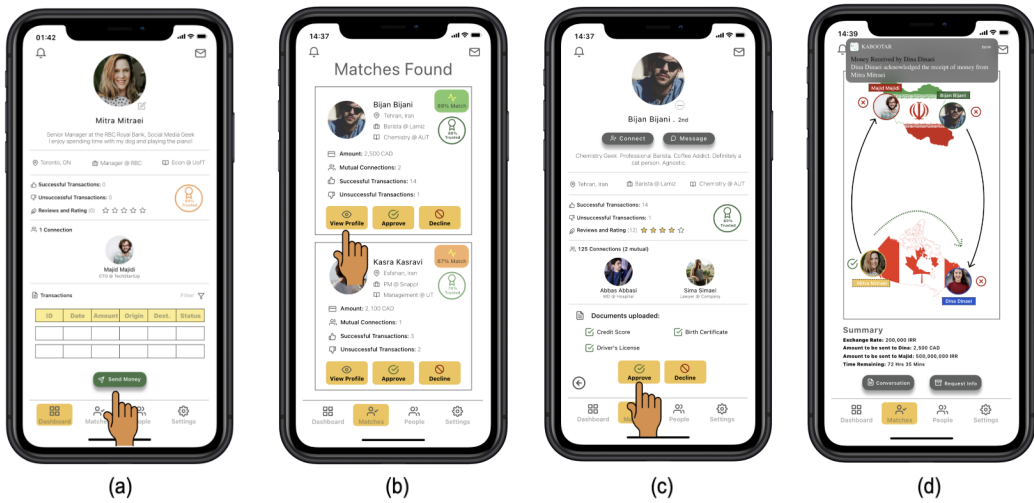
Fig. 4. Selected Screenshots from *Kabootar* prototype on Framer, used during the user study: (a) The user submits a transaction request from the dashboard, (b) The user is provided with potential matches suggested by the app, (c) The user can check each individual profile and make a decision to accept or reject the match, (d) An overview of a transaction with the status and location of the parties involved in the transaction shown.

6.1.1 Participant Recruitment. We recruited participants with diverse backgrounds by initially contacting people from our close networks including family members, friends, colleagues, and students in our institution. A total of 13 participants joined us for the user study. All the participants were Iranian immigrants with basic skills of operating a personal computer and had prior experience in transacting money to or from their home country. We scheduled a Zoom meeting with them based on their availability and convenience. After the study, we emailedthem a 15 CAD gift card as a token of appreciation for their participation.

6.1.2 Data Collection and Analysis. The interviews were audio-recorded with the permission of the participants. Each session took between 90-120 minutes on average. We also took notes of the discussions and opinions of participants. The data collected from this phase included more than 25 hours of audio and screen recordings as well as 100 pages of observation notes.

We first transcribed the Farsi audio recordings to Farsi texts and then translated the texts to English. We then performed thematic analysis on the transcriptions and the detailed notes [50, 142]. While open coding [142], two of the authors independently read through the transcripts carefully and allowed codes to develop. Later they shared their codes with each other. A total of 30 codes spontaneously developed during the first round of the coding. Then we clustered related codes into themes after a few iterations. Some themes seemed recurring, for example, trust in community, privacy of information, sharing information, offender, punishment, etc. They influenced the organization of the findings presented next.

6.2 Users' Evaluation of *Kabootar*

The user study of *Kabootar* proved an initial uncertainty towards using the application, but most of the participants gradually warmed up to the concept and provided us with invaluable feedback. The following section discusses the major themes that were elicited from the sessions.

6.2.1 ***Familiarity and Trust****.* The participants noticed the resemblance between *Kabootar* and their existing *rerouted* methods of transferring money, including bartering with friends, family, and acquaintances. Bartering, one of the oldest forms of transaction, is the act of "exchanging goods and services between two or more parties without the use of money based on equivalent estimates of prices and goods." [11]. The participants explained this similarity using examples of Telegram groups, namely *'Koolbar'*, where they often searched for people interested in bartering goods, services, or local currencies. We quote one of them,

> *"You know this Koolbar group on Telegram. People transfer goods with the passengers travelling to and from Iran. There is this lady in charge of that group that moderates the matches. Your app plays the role of that Lady but in a much easier and organized way." (P10, Female, 40s)*

The participants appreciated the resemblance between *Kabootar* and *Koolbar* as it helped them better understand the transaction process. However, they mentioned that if *Kabootar* was a commercial application, they would not use it to transfer large amounts of money as their existing methods of transferring money through *Sarrafis* are more "familiar" to them. They explained that *Sarrafis* have established themselves and built reputation within the Iranian community over years that while some of the them are not trustworthy and were even previously associated with fraudulent cases, many people in the community still trust them.

Since the process of transferring money between Iran and Canada is relatively complex and the rules and processes often change, many participants were hesitant to learn about yet another method like *Kabootar*. They expressed more interest in holding onto the community's already established methods of transferring money (i.e., *Saraffi*s) as they were habituated to those methods and they were proven to be less risky compared to alternative methods. One of the participants explained this to us,

> *"The process of transferring money to and from Iran is already complicated and exhausting. There are too many unknowns. We have to always be alert for new sanctions, rules, and restrictions. It takes time for us to fully adjust to new situations and the best course of actions. I see the process of getting used to a new platform, especially before it's fully tested and frequently used by the community, to be risky. " (P4, Male, 30s)*

During the user studies, participants mentioned that they require some time and experience to get familiar with a platform like *Kabootar* before fully adopting it. A popular opinion was to begin with sending small amounts of money and gradually increase this amount upon satisfaction with their experience. This line of thought aligned with the our proposed strategy to increase the users' transfer limits as they improved their trust score through successful transactions and completing their profile. Some participants believed that the number of active users on a platform could be a good indication of its trustworthiness, as we quote one of them,

> *"...(A)t the beginning, I would only upload my driver's license and credit score. When I'm sure that this app is not a scam and is actually finding good matches for me, I will provide more documents. I need time to trust the application. When more people start using it, I would also be more encouraged to become a frequent user." (P10, Female, 40s)*

According to this participant and a number of others, trust is important, not only for the process of transferring money, but also to keep the users' personal documents on the platform secure. This theme of privacy was raised repeatedly and we will discuss them in a latter subsection. However, the participants believed that their privacy concerns regarding sharing personal identity documents on the platform could be diminished if they find that a majority of users perceive the platform as a safe space for their documents.

Most of the participants welcomed the idea of combining the concepts of community and money transfer in one platform. However, several reservations, tensions, and criticisms surfaced during the user studies that describe in the following subsections.

*6.2.2   **Trust in the System**.* Our study found several important factors that shape users' trust in *Kabootar*. Among them, privacy and legal protection were more frequently discussed.

(a) Privacy of Profiles with Personal Documents.   While many participants believed that being able to view personal information on a users' profile would help them better trust that user, they themselves were reluctant to share this type of information on the platform. We pointed to a number of existing FinTech applications that require similar information and asked how they view *Kabootar* any different from them. Some mentioned that their reservations were not only limited to *Kabootar*, but they tend to behave similarly in other online spaces as well. The participants were curious about the purpose of providing their personal information and were vigilant about who would be handling them. This participant said,

> *"I never upload any proof of identity on any application. I do not even trust the big companies like Airbnb, let alone your application. What if there is a leak in your database? Who is responsible for that? Hackers collect multiple pieces of personal information from different platforms and this opens up the doors to exposing sensitive personal information of the users and potential identity frauds." (P8, Male, 50s)*

This deep mistrust and refusal to share private information on a digital platform matched with the findings of other studies on various marginalized groups [48, 56, 57]. However, three participants mentioned that they are open to share more information in order to get a better service from the application. We noticed that this way of thinking is more common among the younger participants. One of them said,

> *"I am the type of person who provides every single information that applications ask for. This way, my name will come up when friends search for me. I also get better services from the application. Even in applications such as Uber, I have all the information (bio, accurate profile picture, etc.) uploaded and up to date. I do not hesitate to provide more information if it means I will get a discount, or a better match. If it is anything like Starbucks star rewards, I am sold!" (P13, Female, Under 20)*

From the sharp contrast between the approach of the above mentioned participants towards privacy versus better service, we became better attentive about the sensitivity of this issue and envisioned future mechanisms to cater to both groups.

(b) Selective Disclosure Mechanism for Private Information Although many participants noted that seeing other users' information was important for them to trust the matches, they were also worried about their on the information they provide on the platform. The user studies revealed many privacy concerns raised by the participants, including the following participant, who suggested selective access to information for users,

> *"I feel more comfortable sharing my documents with specific matches rather than sharing them with everyone on the application. I also like my documents not to be saved on the servers of the application and just be kept between me, my recipient, and the people that I have been matched with. A feature for the documents to expire after a specific period would also be a great addition."(P12, Male, 20s)*

The features imagined by this participant are well-aligned with the threefold privacy management techniques proposed by Palen and Dourish [116] who built on Altman's views of privacy as a dynamic and dialectic process [43]. Palen and Dourish's framework allows for selective access to information based on users' roles and previous actions in the system and the context in question

while the access would expire after a certain time. We roughly explained the idea to the participants in a comprehensive way. Our further discussions found that the participants were positive about having more trust in a community-based platform such as *Kabootar* upon incorporating such privacy management mechanisms.

(c) Legal Concerns and Punitive Actions. Many participants had concerns regarding legal issues that might arise from using the application. They wanted the application to take action about all the legal complications regarding their money transfers. In addition to the information provided by the application in a situation where a transaction fails, some participants asked for more assistance and information in terms of how the police could support them. A few participants were hesitant about the feasibility of applications like this for the Iranian citizens given the financial sanctions, as one of them explained to us,

> "I am afraid to use an online application to send money to Iran. What if my money is tracked and held by the Canadian government? I would rather go to the old-fashioned Sarrafis even though sending money through them is a hassle. I would have a better peace of mind this way."(P6, Female, 40s)

Our participants explained that their reluctance to use new methods were not only due to their unfamiliarity, but also how the potential disruptions and scam would be handled from a legal perspective in Canada. Some participants also shared stories about seeking legal help after experiencing mishaps during their money transfers to and from Iran, but unfortunately, their complaints did not lead to any outcomes due to the lack of support from legal systems given the informal nature of their transactions and lack of paper trail. Such disappointing experiences made them skeptical towards the idea of *Kabootar*. They urged us to find ways that ensure some level of legal protection in case of potential setbacks on the platform.

6.2.3 ***Interpersonal Trust****.* The user study of *Kabootar* revealed that being able to trust the other users on the platform was very important to the participants. Consequently, interpersonal trust emerged as a recurring finding from the study sessions. From the participants' feedback when they were thinking aloud in the user studies, we tried to understand how users trust each other and what factors contribute to building this trust. We discuss these findings below:

(a) The power of First-degree Networks We found that our participants tend to trust a few of the small social circles that they belong to while putting less trust in the other communities that they are associated with. For example, the following participant, who is a physician, explained that he trusts the people with the same occupation as him more than others when it comes to transferring money,

> "I am a member of a 1000+ members Telegram group of the Iranian general physicians in Canada. To be a member in this group, you need to show your Iranian and Canadian physician's ID. We then verify each member's photos with their Telegram profile picture. I trust all the members in that group and I'm certain about their authenticity. When I need to send money, I just post my request in the group and within minutes a fellow responds to me. Among all the other Telegram groups, I only trust this one."(P8, Male, 50s)

We learned that there are certain areas in each person's life that induce a strong sense of belonging in them. Taking those aspects and finding communities surrounding these interests would provide a foundation for the establishment and growth of further close-knit communities in networked platforms like *Kabootar*. Contrary to this finding, we noticed a strong wariness in approaching and trusting other people when it came to the bigger communities that the participants are a part of (e.g., the Iranian community of Toronto),

"Oh, do I have to trust the Iranians of Canada in this application? I really rather not! I haven't had the best experiences with them so far. I'd rather deal with non-Iranian people. That way if there is a conflict I can go to the police without any shame or guilt of exposing my compatriots!" (P7, Male, 40s)

The above quote evidently demonstrates the power of first-degree connections over further ties when it comes to trust. We applied this finding to form user clusters based on similarities and leverage the 'sense of belonging' to induce trust.

(b) Stakeholders' Online Identity vs. Authenticity. The skepticism regarding unfamiliar people in offline settings was often extended to the online social media platforms. While some participants were active in social media and trusted the groups in messaging applications, such as Telegram, for a variety of their needs, others were pessimistic towards these spaces and preferred not to participate in them. One of them said,

"I never trust the groups in Telegram or Facebook. I joined them, but I am never active. I only read what other people say. I am very suspicious about the authenticity of people there. There are all sorts of scams going on in the social media and messenger applications, that's why I refrain from participating in them." (P6, Female, 40s)

From many similar opinions from other participants, we learned that in order for all users to take part and engage with online communities, platforms need to provide an inclusive, safe, and transparent environment where the users can feel confident and be in charge of their participation.

(c) Negotiation and Flexibility. We found that our participants considered negotiation and flexibility to be two of the most prominent features of informal transactions. They repeatedly brought up the need to include features for negotiation in *Kabootar* as a networked trade platform. Just like the informal transactions in traditional bazaars, users like to have the option to shop around, negotiate, have conversations, override the formal processes, and come up with creative ways to advertise themselves on the platform. The participants believed that the ideal platform should accommodate users' flexibility in negotiating with other parties involved in the transaction and allow them to change their mind during transactions (e.g., options to cancel or reschedule). Participants believed that such built-in features for flexibility, which are often missing from many mainstream platforms, would help FinTech platforms become more accessible to Iranian immigrants and other similar communities.

6.2.4 **Factors in Trusting Strangers**. After the study sessions, we asked our participants to share their thoughts and feelings regarding the factors that helped them trust a stranger to transfer money. Their responses gave us a deeper insight into what information users would like to see in order to build trust.

(a) Profile Picture. We noticed that profile pictures play a more important role in inducing trust compared to other pieces of personal information. Although several participants mentioned that they would rather put non-personal (e.g., a flower pot) or blurry pictures on their profile, all of them mentioned that they require to see a personal and preferably verified picture of a person in order to trust them. One participant explained this to us,

"Pictures are very important to me, not to trust a person, but it would give me a good reason not to trust someone. For example, I would trust someone who is wearing a suit and tie in their picture more than someone who is posing with bathing suit on the beach. I need to see personal pictures of a match in order to approve them. If the picture is irrelevant, I'm not accepting the match, no matter how strong their profile looks. " (P5, Female, 50s)

(b) Proof of Identity Documents. Having identity documents uploaded to the platform seemed to be mostly important for the participants. The more documents uploaded to the system, the more

the user was perceived as trustworthy. However, some participants expressed their doubts about the documents being counterfeit so they did not consider having documents as important.

> *"I don't care at all about the documents. Even in the applications where documents are said to be verified, I have been scammed. I listed my property on Airbnb and I accepted a "verified" guest. That person also shared additional documents on the platform with me. All were fake. These days it has become easy to forge documents." (P5, Female, 50s)*

(c) Mutual Connections. Having at least one mutual connection was deemed the most important factor (after knowing a person personally) for trusting a match. However, we had a number of participants who appreciated having mutual connections with a potential match but were not comfortable reaching out to them in order to verify that person's identity.

> *"I may not want some friends of mine to know that I'm sending money to Iran. This is a private matter and I'd rather keep my transactions secret from certain friends and family members." (P5, Female, 50s)*

(d) Reviews and Ratings. The reviews and ratings of the matches were also among the important factors that contributed to helping the participants making a decision on whether they trust a match or not. One participants said,

> *"I think having a review system is crucial for your application. You should consider giving credit to people who leave reviews. Like this application, "Shein". This will encourage people to review their peers." (P10, Female, 40s)*

Nonetheless, just like the documents, the concern about the reviews and ratings being fake was brought up by several participants.

> *"I like that I can see the reviews and ratings of a potential match, but honestly I wouldn't put that much of an emphasis on it. You see a lot of products with stellar reviews on Amazon and they turn out to be bad. These days you can buy reviews or make them up easily. Also, most reviews are written when people are emotional. If someone doesn't like your personality, they might write bad things about you whereas you might be a great person to trade with, but not necessarily friends with!" (P3, Female, 20s)*

(e) Religion. Unlike our hypothesis that having common interests or beliefs help users trust each other better, the participants mentioned that they do not value people's religion as much when trusting them. However, there was a catch:

> *"I don't care about a person's religion in my day to day transactions. We don't come to this application to have religious debates. I respect everyone. The only situation I would hesitate trusting a potential match is if they openly speak against the god or mention specifically in their bios that they are atheist. I still respect them as a person but I'd rather deal with someone who worships god." (P5, Female, 50s)*

(f) Trust Score. The trust indicator on users' profiles was well-received among our participants. Some of them expected the trust score to be less biased compared to human-generated reviews,

> *"I have more confidence in the trust score than reviews. Trust scores are more impartial and less influenced by feelings compared to reviews. I think that's a more accurate representation of a person in terms of trust in the context of money." (P10, Female, 40s)*

While the trust score badge was received positively among our participants, it seemed to be acting as a complementary element in trusting a match rather than an indicator that users could solely depend on. In the following example, this participant was more inclined to rely on their own social network over the trust badge provided by the application,

"I think I prefer to double-check a potential match's authenticity and trustworthiness with the mutual friends I have with them rather than solely depending on the trust indication. It's a good indicator, but it certainly is not enough!" (P11, Male, Under 20)

Ultimately, our participants mentioned that the decision on trusting a stranger, boils down to the voice of their "gut feeling" about that person. These feelings are usually an overall perceived impression from a person based on many personal as well as socially acceptable factors. Such feelings are often not rooted in any of the individual factors themselves, but is rather dictated by the lived experience and personality of the decision maker.

7 DISCUSSION AND CONCLUSION

In the sections above, we presented the ideation, design, development, and user study of *Kabootar* - a community-based international money transfer platform for immigrants and refugees from countries under financial sanctions. We have described how the design is motivated by the struggles of many immigrants from Iran and other countries and how the existing formal money transferring technologies fail to address their needs. We described how our design was inspired by the existing international money transferring practices within the Iranian immigrant community in Toronto, Canada. We also detailed the development process of the *Kabootar* system and presented the feedback that we received from participants during the user study of *Kabootar*. The design, development, and evaluation of *Kabootar* engender several important lessons for CSCW and related domains that we describe below.

7.1 Design Implications

We position this work as a design paper. Therefore, based on the feedback from the users, we propose design implications for *Kabootar* and similar applications in the informal domains. First, our findings suggest that the degree of participation and visibility should be at the sole discretion of users. A good example of this is making the input of some information optional. Second, addressing the context-specific problems of users should take a high priority in design. For example, issues such as fluctuation of exchange rates between the time of request and the time of the transaction (especially for volatile currencies) or lack of favourable matches for urgent requests should be addressed in precedence of general usability problems. It is crucial to maintain the trust of vulnerable communities who put their faith in these applications, so full transparency (e.g., reporting estimated wait times, showing the average response time of the users) and software self-disclosure should be a requirement. Third, having preventative mechanisms in place to avoid unfulfilled transactions can be a valuable addition. For example, suggestions on who should send money first based on trust score might help reduce the number of faulty transactions. Additionally, adopting invite-only and user-verification mechanisms to fully register on the application, as well as adding the option for users to connect with their social media or bank accounts, could further limit the access of potentially ill-intentioned users. Lastly, we suggest incorporating standard UX practices and customizable features (e.g., language) for a more accessible design.

7.2 Design and Informal Activities

Designing for informal economic activities does not often go hand-in-hand with the governments' policies. This is a relatively novel avenue for CSCW and related disciplines. As argued by Chandra [54], informal activities are flexible and "offer services that are unavailable in the formal economy but exist as an integral part of everyday life". Therefore, for financial technologies to become truly "ubiquitous" and "pervasive", they need to transcend the formal boundaries and integrate with the informal, everyday lives of consumers. However, studying informal activities requires a deeper

engagement and understanding of the users, the communities they belong to, and their practices - which are often absent from traditional formal methods of user studying in CSCW, HCI, and social computing. This calls for employing a variety of novel data collection and analysis techniques in order to obtain different pointers, each shedding light on a different aspect of the complex historical foundation of informal spaces that go back to many years of practice.

The success of informal economic practices lies within the users' ability to control the degree of visibility [54]. While one of the main goals of formal systems is to increase surveillance (and, as a result, accountability) of workflows, informal systems have historically tried to bypass the bureaucracy (and surveillance) to decrease costs and speed up processes. As argued by Rohanifar et al., we also find it necessary to emphasize that informal economic activities are not always in contestation with formal regulations but often find ways to inhabit within the boundaries of law [128]. Ultimately, tensions between the formal and informal manifest as trade-offs between accountability and flexibility.

The dynamic and ever-changing nature of informal activities requires constant re-configuration of tools to mold into solutions that cater to the unique needs of communities, thereby placing the users in the driver's seat of technology instead of designing technologies that drive users. This appears to be in contrast with the existing established routines of corporate technologies that take full accountability for procedures, when in fact, alternative initiatives that delegate architecting the course of actions to the users might be a better answer in specific cases, such as applications to empower marginalized communities.

A shift towards this approach requires time and gradual acclimatization to unfamiliar technology solutions that stem from the familiar offline informal practices enmeshed in everyday life of users. The initial shock and rejection followed by a gradual warm-up to the idea of a community-based financial application by our participants can be explained by this. In order for CSCWand related domains to embrace informal activities, researchers need to carefully consider the distinction between the traditional control mechanisms in informal spaces (such as reputation and social capital) versus the similar practices in formal spaces and acknowledge that such instruments cannot be easily replicated and placed in the formal systems without proper foundations. It is of utmost importance to recognize that the digitization of informal practices and the transition from the offline to online spaces that allow for informal practices require graceful integration, designing for generosity, and attending to "socio-cultural and historical specificities" [101] for a responsible system design in bureaucratic contexts such as fintech applications.

7.3 Privacy and CSCW

The tensions with privacy that emerged from our evaluation guide us to a deeper understanding of the sensitivity of incorporating privacy in design, specifically at the intersection of the two delicate practices of finance and social communication. While privacy has remained a non-negotiable aspect of design in most collaborative social computing artifacts, designing for vulnerable populations such as immigrants and refugees involves a deeper engagement with this issue. As highlighted in the findings section, some of our participants were not comfortable sharing basic information about themselves, such as their photos or names with the other users on the application even when they were convinced that their activities on the application do not entail legal consequences. The exertion of such conservative behaviors from participants might be explained through their prolonged exposure to oppression, surveillance, and living in constant fear of loss. We argue that merely having privacy protection mechanisms may not suffice to increase the confidence of vulnerable communities in using technologies.

We turn to Palen and Dourish's boundaries for privacy regulations [116] as effective measures to be incorporated in networked spaces such as *Kabootar*. Maintaining the *identity boundary* allows

users to disclose different aspects and degrees of information based on the identity role they take in specific contexts. For example, the information one is comfortable sharing with a colleague might differ from what they choose to share with a close friend. Having the *disclosure boundary* in place provides selective disclosure of personal information. An example of this is the difference between the information users share on social media about their hobbies and interests while refraining from revealing further personal information such as their social security numbers. Palen and Dourish suggest that, ironically, in order to maintain a degree of privacy or to be accepted as an active participant in the networked world, one is required to disclose some level of personal information. Subsequent problems arising from active participation through disclosure can be avoided by making the user participation deliberate and letting the user determine their bounds of identity definition. Finally, the embodiment of the *temporal boundary* ensures that the choice of disclosing specific information is contingent on the information disclosure in the past. A good example is comparing the information shared with someone on a first date with the information disclosed years after marriage.

7.4 Trust and Computing in the Context of Informal Finance

We bring to the fore the critical role of trust in bridging the gaps in interdisciplinary spheres, including the intersection of finance and social interactions, and argue for novel design approaches to build and maintain trust in these domains. Even though our participants were comfortable trusting their social circle, the strangers they got to know through their network, or even completely unfamiliar people on messaging applications, such as Telegram, to transact money to and from their home country in offline settings, we noticed a resistance towards the adoption of similar processes in online environments. At the surface level, the discrepancy between the reception of the same practice in the online versus offline world appears confusing; especially while numerous applications (such as Uber and Airbnb) have found their way into the day to day lives of their users by providing online solutions that are direct translations of offline practices of communities. We believe the broken links that cause this discrepancy are:

(1) A lack of financial literacy and knowledge among users concerning their rights and their scope of financial freedom within the boundaries of the law, and
(2) The fear of getting scammed or the leakage of sensitive information through security breaches that exacerbate in online settings (majorly caused by a lack of transparency from financial institutions).

Such factors further enforce the existing barriers of entry to accessible FinTech for marginalized communities. CSCWand related fields can help the technologically marginalized users to regain confidence by designing technologies that:

(1) Educate the users to make informed decisions,
(2) Help them reflect on their uncertainties and support them in overcoming these fears from previous unpleasant experiences, and
(3) Continuously engage with them to capture their needs as they emerge.

Building robust and sustainable online communities around finance that allow for users' engagement can help marginalized users trust each other and the system over time and utilize the power of close-knit networks to transfer money in a safe, transparent, and agile way. In doing so, designing for empathy can promote awareness about the ongoing situations of marginalized communities, stir up conversations around the less-frequently discussed situations of them, and further spark ideas and solutions among the CSCW, HCI, and social computing research community to address the needs of invisible communities that exist at the margins of society. Such measures often go beyond

the typical design practices, but we suggest should be taken seriously in designing collaborative tools for more vulnerable communities, including immigrants and refugees.

7.5 The Social and Transnational Life of Money

While money serves as a medium for the creation and transfer of value, goods, and sentiments, it is also influenced by societies and cultures that utilize it [76, 163]. Money governs many aspects of societies; however, as Viviana Zelizer says, societies are what give meaning to money and dictate what it signifies to them [163]. Every society views and experiences money in a unique way which could be drastically different from others' understanding of money. As observed in our study, state imposed restrictions such as 'sanctions' are often not aligned with the societal norms, values, practices, and hopes. The 'political' as shaped by the nation-states, in such cases, attempts to ignore and overpower the everyday 'social'. In response, as evidenced in the findings of this paper, the society fabricates innovative mechanisms to resist. Such moments demonstrate how money leaves the formal definition of a state-controlled economic apparatus that condition the society, and becomes a social vehicle for sustaining broader shared cultural values that stand up trust, collaboration, and informality. In this paper, we bring to fore this social aspects of money and encourage researchers to pay extra attention to this dimension of money, especially when it crosses borders and adapts to different societies.

The broad findings from the Kabootar study can be further generalized and applied to other communities who are facing similar sanctions and are barred from using mainstream financial technologies. As mentioned earlier, several other countries, including Afghanistan, Palestine, Libya, Myanmar, Syria, Sudan, and Cuba, are similarly boycotted from international money transferring applications such as PayPal and WorldRemit [22, 24]. Regions like Lebanon and Bangladesh are also occasionally absent from the list of available countries in a number of money transferring applications [22, 32]. This lack of availability is often due to political disputes [68, 117, 123], national policies [32, 39, 99], or infrastructural vulnerability [39, 134]. While the mainstream money transferring platforms are not the only formal options to send and receive money for the citizens of these countries, given the worldwide adoption of the mainstream FinTech, the unavailability of their services causes limitations for the citizens of the banned regions. Therefore, informal, user-centered, and collaborative platforms like Kabootar can potentially fill the void of formal mainstream applications. We recommend applying similar user-centered design methods as well as employing the lenses of informality and collaboration in studying similar communities and leave the implementation for the future work.

Although the broader takeaways from our study can be utilized for similarly marginalized communities, certain aspects such as technical details, or cultural subtleties embedded in our proposed design cannot simply be transferred to other seemingly comparable contexts. Every society is different, and therefore practical designs can be achieved when researchers and designers proceed with care by 1. Studying the cultural norms and existing adopted workarounds of each population, 2. Involving members of marginalized groups in the design process, and 3. Applying appropriate contextual nuances to their proposed design. The highly complex and sensitive issues of finance and immigration require delicate navigation. One of the main lessons learned from CSCW and related research is that universal, one-size-fits-all solutions often fail to serve everyone and inevitably result in marginalization of certain populations.

8 LIMITATION AND FUTURE WORK

Our work has several limitations. First, most of the interview and co-design participants were recruited through snowball sampling and therefore mostly belonged to researchers' primary and secondary connections. Unfortunately, our participant recruitment coincided with the spread

of COVID-19 and provincial stay-at-home orders. Consequently, we were not able to recruit a considerable number of participants using in-person recruitment methods such as flyers or bulletin announcements since most of the staff, students, and faculty were getting prepared to take a physical leave from the University. Since we recruited the participants through convenient sampling, our work is not free from participation and selection biases. In order to reduce the biases associated with the snowball sampling and increase the diversity among our participants, we also shared the questionnaire in various social media to increase exposure. Second, we did not engage with any participant other than Iranian community for co-design and user study due our limited reach. Thus, we did not gain any insight into their experiences of economic marginalization in conducting transnational monetary transactions. Therefore, we expect our findings and design insights to be relatable only to the communities which are barred from cross-border digital transactions. However, the arguments and lessons from this study will contribute to FinTech design for Iran and other similar economically marginalized countries.

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