

Digital payment and its discontents: Street shops and the Indian government's push for cashless transactions

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ABSTRACT

In November 2016, the Government of India banned the vast majority of the nation's banknotes in a move referred to as 'demonetization', with the stated goals of fighting corruption, terrorism, and eventually expanding digital transactions. In this study of 200 shop-keepers in Mumbai and Bengaluru, we found that cash shortage increased digital payment adoption but that digital payments fell after new banknotes became available. Digital payment adoption depended on the nature and scope of transactions, type of product sold, as well as personal factors specific to business owners such as comfort and familiarity with other digital technologies and online transactions. Using theoretical work on market and information behavior, we examined environmental pushes for technology adoption against prevalent transactional practices, trust, and control. We propose that the move toward digital payments must be framed within a larger undertaking of technology-driven modernity that drives these initiatives, rather than just the efficiency or productivity gains digital payments present.

Author Keywords

Mobile money; technology adoption; India.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous

INTRODUCTION

At 8:15 pm Indian Standard Time, Nov. 8, 2016, the Prime Minister of India, Narendra Modi, announced that starting at midnight all banknotes of ₹500 and ₹1000 denominations would be illegal tender and had to be surrendered to banks. The credited value of the notes could be withdrawn, with a

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weekly limit of ₹20,000 (~US \$300). These notes represented more than 85% of all currency used in India [1]. The move, commonly referred to as "demonetization," disrupted markets, caused commotion at banks (Figure 1), stock market and real estate drops [2] and even deaths [3] among those standing in long cash queues. The move was at the center of much discussion for its questionable economic logic [4, 5], its implementation without stakeholder consultation, and even its legal basis [6].



Figure 1. Line outside a bank before opening hours during demonetization (Source: wikicommons - kotakkalnet)

The surprise factor and accompanying secrecy were aimed at minimizing any window of opportunity for cash laundering. However, this, in turn, contributed to the information chaos since the sheer scale of the initiative meant that there was no opportunity for preparation, and a lot was left to trial and error. Logistics were challenging: directives on withdrawal and deposit limits often changed, banks lacked the personnel to ramp up operations, ATMs ran dry or were optimized for old currency, and public safety officials had no training to deal with the ensuing scale of citizen pressure.

During his original demonetization address, Modi presented the move as necessary to curb corruption and fight terrorism funding through untraceable cash [7]. He also invoked patriotism, likening the sacrifices of the citizens dealing with cash shortages to those of soldiers defending India [8]. Because of Modi's popularity and parliamentary majority, there was little initial political fallout. However, as public unrest built and cash circulation continued to be low [9], Modi made a number of public addresses. In one of these,

Modi underplayed issues like terrorism, refocused demonetization as having a technological motivation, and likened technology adoption to patriotic civic duty [10]:

But dear friends, you are my true soldiers, my true partners. We have got a wonderful chance to serve our mother India and to take our country to new economic heights. Dear youngsters, can you please help me? You will be with me but that alone is not enough. The older generation does not have the exposure and experience of the new world which you possess. Possibly your elder brother and even your parents and uncles and aunts also may not know. You know what an “App” is, what “online banking” is and how “online ticket booking” is done. For you these are routine things and you also make use of them. But, the great task that the country wants to accomplish today is the realisation of our dream of a “Cashless Society.” – Narendra Modi [8]

Subsequently, Modi promoted a narrative of “going cashless is good for country,” in keeping with his government’s larger campaign on “Digital India,” in his public addresses and weekly radio broadcast [11].

Historically, the use of cash in India has been extremely high, not just in terms of avoiding debit and credit transactions, but in avoiding the banking system altogether and trading in cash. In 2016, the net worth of cash withdrawals from ATMs in India outweighed that of both debit and credit card transactions. This is in stark contrast to the United States, where the net worth of debit and credit card transactions in 2016 exceeded cash transactions [12].

The scale of the challenge in promoting digital transaction in India is highlighted by the low rate of banking — at the time of demonetization, most Indians did not have an operational bank account or had a nominal savings account balance provided by the government. A cultural preference for cash drove down documented accounting transactions. As a result, tax evasion was common — less than 3% of India’s population paid individual income taxes [13].

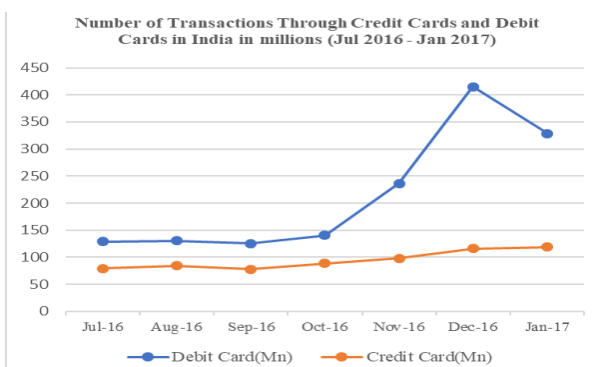


Figure 2. Number of transactions through credit cards and debit cards in India in millions (Jul 2016 - Jan 2017)¹

¹<https://www.medianama.com/2017/03/223-india-28-8m-credit-cards-818m-debit-cards-january-2017/>

Figure 2 shows a rise in debit card transactions — a 300% increase between October and December 2016, at the peak of the demonetization, and dropping 20% in January 2017. The data also show a fall in the cash value of digital transactions, suggesting a change in consumer behavior from using cards for larger transactions to smaller amounts.

In the years preceding demonetization, infrastructure to support electronic transactions had been expanded. With over a billion enrollees for the ‘Aadhaar’ national ID, the notion of a digital being had penetrated the hinterland. Access to mobiles and smartphones increased dramatically and companies providing digital wallet services emerged, allowing transfers on computers, mobile apps or via SMS, a sector that was forecast to grow 148% between 2017 and 2022 [14]. In August 2016, India inaugurated a Unified Payments Interface (UPI) to enable direct transfers from banking institutions. The BHIM (Bharat Interface for Money) app, based on the UPI and allowing peer-to-peer transfers on mobile phones, was released by the prime minister soon after demonetization as an official state-endorsed technology to conduct transactions [15].

However, in terms of the overall forms of non-cash payments — debit and credit cards, e-banking services, and digital wallet services — only debit cards were used by a significant proportion of the population for daily transacting. Before demonetization, about 818 million debit cards were in operation in India, compared to fewer than 29 million credit cards [16], with debit card transactions far exceeding credit transactions. Non-cash transactions were limited to a minority of Indians (Figure 3). However, while cash shortage following demonetization made digital transacting convenient and clearly increased digital transactions in scale, there were still various deep cultural barriers to moving large numbers of Indians away from cash.

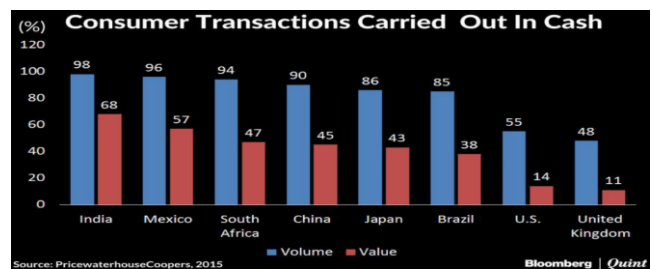


Figure 3. Scale of cash transactions in India compared to other nations [17]

Demonetization increased digital payments in its aftermath, but primarily by only those who were already transacting online. The biggest digital pay service at the time, PayTM, had a gain of 140% in its average daily transactions between November 2016 and February 2017 [7]. Such was its centrality to India’s cashless discourse that CEO Vijay Sharma made it to *Time* magazine’s list of 100 most powerful

people in the world. Referred to as the “King of Demonetization” [19], Sharma became the newest in a list of Indian techpreneurs. Unlike others before him who built technologies for foreign companies or for use by the elite, Shekhar’s symbolic and aspirational value was in PayTM’s visibility in street vending – a common man’s technology,

Demonetization in its broader context was more than just an initiative aimed at impacting economic behavior. It came at a moment when the pragmatics of cashless transaction were wrapped into the aspirational discourse of a digital economy with a spokesperson in a tech-savvy leader, which filtered down to a citizenry slowly adapting to its new found digital identities and low-cost personal devices. Our study thus examines discussions of technology adoption within a developmental political discourse. We explore the tensions between imposing formality in exchanges and prevalent market practices, and we examine the practical challenges with technology adoption for people who are relatively new to digital environments.

We frame this paper within a larger discourse of ICTs for Development, in which there exists a sociotechnical subtext beneath the public purchase, or lack thereof, of a structural push for technology adoption. The case speaks to the politics of technological artifacts [20] in that the move to digital cash is proposed in normative terms as beneficial to the nation. Our results interrogate ways in which individuals, in the context of their own perceptions of a state program, relate to a broader developmental logic of a technological self, wherein the choice to adopt a new technology reflects a notion of enlightened citizenship [21].

RELATED WORK

Three bodies of work are furthered by the case studied here. As we are studying digital cash adoption by vendors, our work intersects with work on markets, and on technology adoption. The overarching literature of intersection is the sociotechnical work that relates technology to modernity within the Global South context, but specifically in India.

Technology-driven Modernity

In the last two decades, digital technology has increasingly been portrayed as synonymous with development goals in various parts of the Global South, particularly India [22]. This development narrative is rooted in state-driven big development of past decades, including post-independence projects such as large dams [23], and has at its heart a postcolonial techno-rationality [24] that the locus of modernity lies not just in the state or collective and its enlightened embrace of technology, but in the embodiment of technology in each individual.

These ideas found much purchase in the Indian political establishment of the early 2000s with a range of e-government initiatives to go “paperless” [25]. The proposed projects were political in that they were presented not just as increasing process efficiencies, but as fundamentally transformative for the citizenry [26]. As with demonet-

ization, the discourse of e-governance was one of bringing modern operational practices and private-sector efficiencies to the business of government [27, 28]. Despite progress with the back-end operations of e-governance and process management [29], the interface of government and citizens has remained a challenge. Uneven adoption of new technologies and of the formal financial system reinforced old inequalities – while a small proportion of urban Indians adopted non-cash transactions, the majority of Indians did not have functional bank accounts. This indeed became a defining element of Modi’s speeches, where he requested that tech-savvy citizens help train their less technical brethren as an act of national service [8].

Demonetization followed what was perhaps the most significant technology-driven attempt to bring the citizenry into the formal economy. Aadhaar, a nationwide biometric identification system that provided an identifier for a range of registration and banking services including state-subsidized direct-to-bank transfers for low-income citizens [30, 31], was an important predecessor in the technology adoption landscape because, as noted by other researchers, price-support systems and food taxes and subsidies shape technological choices and diffusion processes [23]. Despite being initially proposed as an optional service, a gradual creep of services for which Aadhaar was made mandatory, such as pensions, subsidies, and returns, led to a spike in registration, with over a billion Indians registering in what was being referred to as a new citizenship regime [32].

While Aadhaar and demonetization are comparable in that they have impacted virtually all citizens who participate in the economy, Aadhaar was gradual, and the government spent significant effort in both the organizational and technological aspects of adoption [33]. The legitimacy-building process was highlighting the credentials of the key players in the Aadhaar founding team (many of who were respected tech industry figures). and placing this team, and the political leadership alongside displays, props, and narratives that crafted an identity based on its benefits for the common people [34]. With demonetization, the secrecy surrounding the effort meant the push for adoption was a shock event, and the corresponding lack of ‘experts’ underwriting the move meant that its legitimization would be driven by the government’s plug for the move.

Markets

Post-demonetization, informal markets unregulated by the state played were at once the institution that the state was trying to curb as well as what citizens turned to when softening the economic shock. A large part of the rhetoric of demonetization was aimed at reducing the “underground economy” — a term that often incorrectly clubs the “illegal economy” with the “informal economy” [35].

The boundaries between the formal and informal are, however, often fuzzy at local economies across much of India, where everyday practices are embedded in networks of existing social institutions [36]. Changing peoples’ market

behavior requires introducing strong incentives to change, or making past behavior untenable. In short, people will resist change. Research shows that people continuously leverage their social ties to function effectively [37, 38]. The resultant social capital is an integral part of the livelihood strategies of economic actors, often helping them withstand adverse trends and shocks such as currency devaluations and natural disasters [39]. In this case, the interesting question from an informal-markets practice is whether this social capital can be employed to delay or avert the suggested behavior change.

The vendors we study here operate at the intersection of the formal and informal economy, in that while they are formal institutions, they have practices related to price flexibility, procurement, and accounting that may exist outside formal regulation. Studies in the past have highlighted the importance of personal connections in market navigation, often more than formal tender [40]. The state, in particular, needs enforcement capabilities to impose rules, failing which markets partition themselves into enclaves of formal capitalism and informal self-regulated economies [41]. The scale of demonetization was such that one element, the exchange of old notes for new, was clearly within the state's control. However, the overall functioning of markets was still driven by existing practices which the state has limited ability to change.

The flexibility of informal economies comes with a social cost — it inordinately benefits those who have strong social ties or reputation in local networks [38], often leaving several actors without access to sufficient resources particularly during crunch periods [42]. Information access is central to the functioning of markets, and everyday practices often evolve to overcome information scarcity [43]. Market actors to rely on networks and long-term relationships to circumvent a lack of information [44]. Demonetization represents a tension in that market actors can either adopt the new technology that helps offset some of the cash crunch, but which requires certain access to information and technology know-how to adapt, or they navigate the situation through existing informal means, which again favors certain market actors over others.

The relationship of information and communication technologies to these markets is complex. Individual actors in markets behave in accordance to their peers and technology adoption is driven by internal and external economies of scale. While in some cases communities seamlessly diffuse them into existing practices [45], in others, the lack of supporting institutions or infrastructure has the potential to disrupt existing practices [46]. In addition, seen as a top-down nudge as a within the broader context of the preceding Aadhaar project, there is the implicit panoptical intent of the state attempting to track the individual economic agent [47]. Decisions to adopt digital payments thus are a balance between what customers prefer for their convenience and what the vendors and their ecosystems of suppliers are willing to accept as surveillance.

Individual Digital Payment Adoption

Related to the work on markets are studies that have sought to empirically trace the reasons why individuals accept or reject digital transactions based on factors related to the interface, or to its perceived relevance in their lives. Researchers on technology adoption have often viewed the adoption decision in dichotomous terms — adoption or non-adoption. This needs to be extended to examine the mobile money uptake in the contextually specific settings of low- and middle-income communities [48, 49, 50].

Researchers have also pointed out that adoption itself is a less critical question than, for example, the frequency or intensity of use and when and by whom [23]. While the Indian government may see aggregative benefits from digital cash, its value may not be immediately obvious to business owners. Blumenstock et al. [51] have shown that while digital payment systems have benefits for organizations such as reducing the costs of transactions and fraud, they do not offer the same benefits to individuals who are made to adopt the new technologies, or improve overall financial inclusion. Similarly, while electronic cash distribution offers benefits in food spending, it does not necessarily lead to improved financial inclusion [52].

The factors influencing variations in adoption are diverse. Medhi et al. [53] in a study of five m-banking services found that the adoption by low-literate, low-income users is contingent on factors like household type, services adopted, pace of uptake, frequency of usage, and ease of use. Other structural factors for low adoption include the need for supporting services such as a bank account [54], perceived risk of loss [55], trust [49], and quite simply the issue of changing from an existing means of exchange that people don't perceive a problem with [48]. The abstract notion of a wallet, in the case of a digital wallet, is also a problem, not just for people who don't typically have wallets, but also for people who still conceptualize the mobile as a communicative rather than transactional device [56].

In her recent work looking specifically at street sellers in India post demonetization, Masiero argued that technology adoption poses individual information poverty challenges, in that the poorest risk further marginalization because they do not know how to cope with a cashless economy [57]. The technological push creates a false specter of choice — theoretically, multiple technological options exist. In reality, however, intended users' access to and ability to use those options are limited. In effect, the “socio-technical gap” that exists and toward which technology is directed in turn accentuates those differences [58].

METHODS

We spoke to a total of 238 vendors for this research. Among these, we conducted 38 in-depth semi-structured interviews on-site, ranging in length from 30 minutes to 75 minutes. We conducted interviews in Marathi, Hindi, and English in Mumbai (10 interviews), and in Kannada and English in Bengaluru (28 interviews).

We administered 200 surveys following the completion of the first round of 10 interviews. Survey questions were based on the key themes from the first round of interviews and had 44 close-ended and 20 open-ended questions, of which five questions elicited paragraph-style responses. Surveys typically lasted about 25 minutes. A total of 102 surveys were conducted in Mumbai and 98 in Bengaluru.

The survey aimed to capture people’s attitudes toward payments and demonetization, alongside profiling their technology access and comfort. We focused on shops that dealt with drop-in customers because commercial or niche stores tend to have established means of non-cash payment or larger-scale transactions. Thus, we excluded stores dealing with hardware, travel, and financial services etc. as well as with essential services such as government ration stores and gas cylinder agencies.

We selected six neighborhoods each in city and conducted stratified sampling by geography, not type of shop. We define street shops as stores that have a street front and operate on drop-in traffic off the street. There is thus an overrepresentation of certain types of stores depending on the neighborhood concentration. This is in part because the two cities are also somewhat different in terms of neighborhood structure. Retail in Mumbai is shaped by proximity to the transit — items of non-daily consumption tend to be closer to rail and bus networks, whereas provisions (grocery/daily item) stores and food and beverage vending tend to be more evenly spread throughout the city. Mumbai also has a culture of medical stores that offer pharmacy items as well as household goods similar to those sold in provision stores. Bengaluru, on the other hand, tends to have a greater mix of casual purchase stores across micro-neighborhoods.

Product Type	City	
	Bengaluru	Mumbai
Apparel and Accessories	41%	15%
Books & Stationery	20%	7%
Food & Beverages	9%	31%
Medical	4%	16%
Other	19%	6%
Provisions	6%	25%
Total	98	102

Table 1. Types of shops sampled by city

We did not survey any chain stores, which have generally accepted non-cash payments for years. This also partly explains the relatively smaller concentration of provisions stores in Bengaluru, where access to department-type stores in neighborhoods is more common than in Mumbai (Table 1), where high real-estate prices have contributed to more tightly spaced mom-and-pop establishments.

We conducted interviews to get a deeper nuanced understanding of people’s adoption of cashless payments and

² Indian national tax ID card

their attitudes toward technology. They were also conducted at the commercial establishment. All interviews were translated and fully transcribed in English.

We use a mix of data and theory-driven coding techniques [59]. The first round of analysis was data-driven. Without any thematic preconceptions, all coders separately read and annotated the documents. Each coder came up with his or her independent codebook. All coders then met to group codes based on the major themes, twice using a hierarchical agglomerative technique to cull parent concepts from a large number of themes. We renamed commonly identified ideas as themes. Our first themes were “Market Shock,” “Technology Perceptions,” and “Adoption Drivers.” Table 2 describes the nested subthemes.

Parent Theme	Nested Themes
Market Shock	Credit access, familiar networks, demand adjustment, knowledge, state circumvention, physical inconveniences
Technology Perceptions	Interface challenges, control, technophobia/misinformation, network effects, materiality/comfort with human banker
Adoption Drivers	Family member, gateway applications

Table 2. First round of coding

For the second round of coding, we used a theory-driven process. Based on the first round of themes, we discussed the major theoretical bodies of work that were useful in looking at this work. During this round, we combined Technology Perceptions and Adoption Drivers into a single category and separated “Market Factors” into a second. From the nested themes, an important category emerged having to do with the state. This was driven by the repeat prevalence of two topics — discussions about Aadhaar and the presence of the state in people’s lives, and discussions about patriotism as related to the cashless economy. During this second, theory-driven element of coding, we sought to find how modernity and the state emerged in discussions.

FINDINGS

Markets

The scope of cash exchange was a problem for shopkeepers as they typically held more cash than exchange limit. Consequently, a temporary economy emerged around assistants for queueing tasks as shopkeepers tried to work out the changing rules on what amounts could be deposited/withdrawn, how many transactions allowed daily, and documentation was required to change currency.

One of my people would make the deposits. I had to send all my original documents like my PAN card², AADHAAR card³ etc. Every time! So initially the first 15 days was

³ General national identification card

painful. The boy had to take my documents and also his PAN card Xerox to make the deposits every time. – Small Electronics Store Owner, Bengaluru

This also meant that networks and the willingness to dip into them were essential because shopkeepers and their assistants had to often go to multiple branches in a day as they maxed out limits. Having a trusted person go to the bank, helped, in part, to manage the issue of information scarcity or noise. Thus, to cope with the new rules, people had to — rather ironically — move to either the informal economy or use contacts in their personal network since there was no reliable means of getting this information on the phone or online. Instead of turning the money digital through a bank, many shopkeepers reported the opposite of what the government wanted. By tapping into their micro-environments, shopkeepers resorted to “selling” some of their excess cash at a discounted rate to people willing to scalp the cash. Another way of scalping the cash was to pay someone a fixed fee or percentage for standing in line. For shopkeepers who did not have employees, it became essential to tap into neighbors, assistants at other shops, or temporary workers from the informal labor market.

...those workers are given a 'coolie'⁴ of 500R / ₹1000 for this job. (for) ₹250,000, if you go and put to the bank, they will pay you ₹500 per day for the time you wasted in the queue. For the money, everyone gets involved, forgetting about their work. – Tailor, Bengaluru

Access to these personal networks during this phase, however, was driven by geography, long-term relationships, and personal reputation. Immediate cash was replaced by deferred payments that leveraged informal credit networks. Knowing someone personally in one’s immediate vicinity drove the practice of adjusting payments wherein vendors allowed trustworthy customers to pay later.

...have written small slips for customers and asked them to collect their change the next day. Everywhere it doesn't work out well. People who know you will adjust or give change to you but those whom we don't know will tell "I do not have change for these notes please pay (in change)." – Restaurant Owner, Bengaluru

In this restaurant owner’s case, the low-tech paper-written notes sufficed, in part because there was an additional overhead of learning a new practice at a time when they had no time to spare. The limits of exchange low enough that even very small businesses needed to do multiple trips during the weeks following demonetization. Importantly, none of the shopkeepers reported consciously reducing cash reserve under the expectation of greater digital cash use by customers. In other words, they expected the majority of their customers not to change their purchase behavior.

Businesses were part of a community. There were regular customers, for example, people in the neighborhood, who could be expected to self-regulate and pay later, without the need to keep records of the debts. Moreover, during demonetization businesses leveraged social ties by turning occasional drop-ins (such as a diner who had come to a restaurant once or twice) into relatively stronger social ties by offering credit. However, this also meant that vendors who operated outside the “regular customer” territory were at higher risk of loss. This ends up affecting some of the poorest people, such as pushcart vegetable vendors and auto-rickshaw drivers, as confirmed in other research [57].

People were surprised that such a huge shop in Dadar and still these people are happily running their business without high-tech stuff ... (but those) who order costumes prefer cash only. So why to force other methods on them? I believe in using whatever works for my customers. – Garment Shop Owner, Mumbai

The choice of payment method was dependent on customer preference. Customers’ unwillingness to adopt cashless payments impacted shopkeepers’ tech adoption decisions. Materiality played an important role in how digital technologies were adopted and used. While in many parts of the West, expensive items tend to be purchased on credit, here the opposite is true — the ability to physically touch or examine the good is a source of confirmation and comfort. Our respondents’ reports of limited customer adoption confirm research on market practices in India, where middle-class customers still prefer shops than buy online especially with goods perceived as needing inspection [44].

Will you purchase ₹1 lakh item online? No you won't buy. 5-10 thousand you buy blindly. Ok I can get return. But something expensive you know is Indian tendency, feel, touch. – Small Electronics Store owner, Bengaluru

In India, there are ‘caveat emptor’ laws that expect buyers to be cognizant of their purchases, unlike in many parts of the West where returning goods is part of the consumer culture. Consequently, both buyers and sellers value the tangibility of transaction closure. This distinction between the tangible physical artifact and the digital manifests itself across everyday practices that involve trust. We thus see that paper documentation continues to play an important role across sectors in India that have gone digital, as physical copies of documents are regarded as more authentic [60]. Similarly, as we see in the following quote, digital records of transactions are still not trusted and there remains doubt about whether they would be honored by the legal system.

...like preserving the challan or having entries in the passbook. It's physically present there. Getting notifications through messages is fine but what if I delete those messages by mistake? See if I pay a person using cheque and it's getting processed and my challan, pass book are

⁴ A derogatory term for casual labor work

updated but after two days I get a message on my mobile regarding failure or transaction and someone deletes it. I lose all information of the cheque transaction. Can I produce it in the court? – Restaurant owner, Bengaluru

The lag between the introduction of digital tools and the evolution of trust in the ability of supporting institutions to adapt is crucial in understanding the hesitance many vendors have in adopting digital payments.

Technology-driven Modernity

The powerful effect of Modi’s marketing of technology adoption on demonetization is visible in two specific ways. First, the move is invariably attributed to Mr. Modi himself, not to the government. Second, there is a reluctance to separate individual experiences with demonetization from what is good or bad for the collective. For instance, after critiquing cashless transacting, the following restaurant owner made the meta case for cashless transactions as a development outcome for the poor, marginal vendor.

But, whatever order Narendra Modi passed is actually good. Today even a small vegetable vendor has started using a swiping machine. We could not use it back then. What we used to do is stock up the cash we get and pay someone commission. – Restaurant Owner, Bengaluru

However, such stories of street vendors using swiping machines did not match our interviews, though small, suggesting that the discourse of technology reaching the poorest was resonant outside of its empirical verifiability.

Demonetization Good for You	PayTM personal use account		PayTM vendor account		Total
	No	Yes	No	Yes	
Maybe/Can't Say	91.3%	8.7%	69.6%	30.4%	69
No Effect	50.0%	50.0%	66.7%	33.3%	6
Overall Negative Effect	77.5%	22.5%	86.3%	13.8%	80
Overall Positive Effect	64.4%	35.6%	66.7%	33.3%	45

Table 3. Perceptions of demonetization value for oneself by personal or business PayTM use

We asked in our research whether people thought that demonetization worked well for them, and found that those who had adopted digital payments (in this case PayTM) for personal purchase transactions use outside of their business use had a perceived positive effect of demonetization for the individual: $\chi^2(3, 200) = 14.905, p < 0.01$. Similarly, not using PayTM as for transactions as a vendor corresponded to higher overall perceived negative effect of demonetization for the individual: $\chi^2(3, 200) = 8.463, p < 0.05$. Thus, being an active technology user oneself corresponded with a positive view of the move (Table 3).

The results for how people perceived the drive as a national project were far different. Here, we found a much lower

perception of the negative effect of demonetization, including by a majority of those who perceived its effect as negative for themselves. Vendors who had started accepting digital payments for their business such as through PayTM vendor accounts had a higher perceived positive view of demonetization for the country: $\chi^2(3, 200) = 11.005, p < 0.05$. Likewise, individuals who used PayTM for personal use were more likely to believe that demonetization was good for the country: $\chi^2(3, 200) = 15.168, p < 0.01$ (Table 4).

Demonetization Good for Country	PayTM personal use account		PayTM vendor account		Total
	No	Yes	No	Yes	
Maybe/Can't Say	88.4%	11.6%	75.8%	24.2%	95
No Effect	0.0%	100%	0.0%	100%	1
Overall Negative Effect	78.1%	21.9%	93.8%	6.3%	32
Overall Positive Effect	66.7%	33.3%	68.1%	31.9%	72

Table 4. Perceptions of demonetization value for the country by personal or business PayTM use

This emphasizes the power of the nation-building discourse that accompanied the demonetization move. This complicated people’s willingness to be critical of cashless transfers because they were concerned about being seen as bad citizens. However, respondents who felt forced to adopt digital wallet systems right after demonetization were openly resentful. The following quote highlights how digital payment systems squeeze smaller sellers who do not benefit from aggregative selling, which happens at large stores where people buy more than they intended to.

...if I had to transfer money from PayTM to my account he charges me 2%, which is quite a bit ... the clientele which I have, have never asked me for and eh there are many compulsions in that, you need a certain amount of transaction per month, if not the bank charges you and plus every transaction you're charged 2.75%, that again is on the heftier side. If those things were made easier then surely we would prefer to go the cashless way. Mobile Retailer, Bengaluru

A few vendors were openly disdainful, not just because of their losses and inconveniences, but because they questioned the motivations of the move as a whole.

Whatever happened wasn't positive for sure, it was troublesome for us. They were saying that due to this note ban, there would be less fake currency, no duplication of notes, these Naxalites and terrorists won't get funding. All of this came in the papers but all got what they wanted ... it's a different thing if you are a Modi supporter. For some he is god! God god god! There is abundance of him. (customers laugh nervously. – Apparel Store Owner, Mumbai

Moreover, because leaders were pitching cashless transacting as a nationalistic act, people watched for these leaders to go through similar absorption of risk and discomfort during the transition.

Let me tell you one thing. Let it be any corporation, MLA, MP, CM or PM. Has any one of them stood in the queue to get their notes exchanged? Show me one official who did this. None of them stood in queues. People like me or you went through that trouble. We have not seen even one video till now, showing any one of the standings in line.... So, how did they get their old notes changed then? – Tailor, Bengaluru

This quote highlights why Modi’s perceived personal integrity and his speech requesting sacrifice were so important in communicating the move to the public. But while the people we interviewed spoke of an abstract betterment for the people coming out of the project, they had real concerns about what cashless transactions meant in terms of the government footprint in their lives. The most commonly cited was perceived oversight by the government related to taxation. Cash was untraceable, and in common practice, it was quickly turned into assets such as gold or real estate (which crashed massively after demonetization).

Several respondents, discussing the taxation implications, pointed out that the government was part of the problem that stood in the way of digital commerce. Paperwork related to filing or maintaining commercial accounts was still a largely analog system.

Finally, respondents did not see Aadhaar in the same light as they saw demonetization. The perceived inconvenience with Aadhaar as minimal (stood in a line once), and while respondents internalized it as a technological artifact because there was a technical process involved in getting the card (having biometrics taken), as well as in using it (getting it scanned), it was not something that had a management overhead such as with cashless transactions.

Digital Payment Adoption

The move to a digital economy was easier for those who were already versed with using non-cash means of transacting and operating in the digital universe in general, either individually or as part of their business. Book and stationery sellers, for instance, who dealt largely with distributors and relatively savvy customers, both largely part of a tracked transaction system, were able to reduce their reliance on cash much more than small shops that had workers or suppliers who were mainly cash users.

Few of them [employees] don’t [have bank accounts] and other who do also like to receive it through cash. The thing is they are small workers and they get proud feeling holding the notes in hand as opposed to having it updated in their account. – Restaurant Owner, Bengaluru

A driver of technology adoption was the technological neighborhood. Most (72.5%) of our respondents were

smartphone users, and WhatsApp was the single most widely used product (67%) of the total sample. Several users, when asked about their reasons for getting a smartphone, specifically noted wanting to use WhatsApp. In contrast, none of our respondents stated getting a smartphone with the goal of conducting transactions.

Related, we found that an individual’s comfort with other technologies such as computing and online purchases corresponded to their likelihood of investing in digital pay systems. As seen in Table 5, those who were frequent computer users were more likely to invest in a digital payment vendor account ($\chi^2(3, 147) = 13.402, p<0.01$).

Computer Use	PayTM Vendor Account		Total
	No	Yes	
Daily/Frequent	52.9%	47.1%	34
Irregular	64.9%	35.1%	37
Rare	89.7%	10.3%	29
Never Used	80.9%	19.1%	47

Table 5. Computer use and PayTM vendor accounts

Children often play an important role in introducing parents to digital environments, especially with respect to women, older people, and lower socio-economic groups [61].

My son got me this phone as a gift. I used Reliance 1Rs mobile before this. My son told me that in today's world an old model doesn't work well. He said what reputation will I have if I keep an old model phone. – Apparel Store Owner, Bengaluru

In interviews, it emerged that shopkeepers would mention someone more tech-savvy in the family — usually children — as having an important role in their decision to adopt smartphones and digital payment. As seen in Table 6, when the offspring were involved in decisions, the proportion of shops with digital payment was 100%, compared to 39.8% otherwise ($p<0.01$, Fisher exact test).

Offspring Involved in Decisions	Digital Payment		Total
	No	Yes	
No	60.2%	39.8%	156
Yes	0	100%	9

Table 6. Offspring involvement and digital payment adoption

Respondents’ attitudes about going online were driven by their perceptions of other virtual services — customer care for cable or phone companies, for instance, which were very negatively viewed. Rumors have been found to amplify encounters with digital technologies and reconcile uncertainty [62]. In our study, a consistent finding regarding the reluctance to use digital payments had to do with negative rumors about the risks of digital transaction. For example, one respondent discussed the time he was incorrectly charged Rs. 5300 (US \$82) but connected it to an unrelated event (another person’s loss):

I rushed to Canara bank in Sanjaynagar and they asked to go to my home branch. When I went there the manager told me how many of their customers have lost money this way. Some auto guy lost Rs. 60,000 (US \$1,000), which he had saved for his daughter's wedding. I went to Sanjaynagar police station later and even there the cops told me that they can't help me with this and asked me to be careful. – Flower Shop Owner, Bengaluru

In the story above, the respondent juxtaposed a personal experience with hearsay. As seen in the next quote, similar rumors exist with respect to online shopping, where the lack of transparency and trust in the process is looked at with suspicion and a potential avenue for fraud:

Interviewee: One of my friends ordered a phone online and he received a stone.

Interviewer: A stone? Are you serious?

Interviewee: Meaning it did not happen with a friend but I heard it on news somewhere. Flipkart has this restriction where you can open the box only after paying for the item, else you not have the permission to open the package. This is exactly what they told the guy. So he made the payment and open it later to find a stone covered in paper. – Medical Store Owner, Bengaluru

Such rumors reinforced fears of an unknown transactional environment, get amplified when shared with the larger community and end up comforting status quo.

DISCUSSION

Three major trends emerging from the interviews. First, we find that rather than move quickly to adopt digital transactions, the shopkeepers' response was to maintain the status quo in the short-term by using resources and networks to minimize cash shortages and continue business as usual.

Second, we find that respondents portray demonetization as both modern and righteous as a notion for a larger collective, but as detrimental to themselves as individual agents. While respondents praised the political goals of the idea, few took to heart the dramatic changes to business practices that it prescribed. Even when they spoke as citizens, shopkeepers acted as individual market agents.

Third, we find that digital cash adoption on an individual level relates to awareness both on the personal and collective front. Having tech-savvy family members was important to incorporating digital cash into the business, or even thinking about digital commerce.

This study offers insight into challenges people face when technology is introduced by fiat by governments, without absolute power to enforce them. Consequently, the existence of a purported motivation that is not directly related to improving the individual or organization's functioning, but rather changes existing practices in the name of patriotism or the need for a modern nation built on technology, makes the Indian demonetization a unique case for the social examination of technology adoption.

The political leadership proposed digital cash as the main motivation for demonetization only in the aftermath of the restive early days of the initiative [8]. Real motivations of demonetization aside, Modi's promoting it as technological efficiency rather than as a security concern (as with the use of terrorism prevention in its early avatar) [7] highlights the state's understanding of the allure of the techno-rationale.

The demonetization case highlights the continuing normative application of a technological means of doing something as necessarily superior and desirable [63], and as the solution to developmental state challenge of systemic leakages [64]. While gains have clearly been made with middle-class populations in adopting cashless digital payments, the reset to 'business as usual' by vendors in our sample is in line within reports of the post-demonetization return to cash economy elsewhere in India [65].

Indeed among the unique lessons for technology adoption in the demonetization case was its presentation as a national endeavor. Similar to other mega-projects and large initiatives by the government, demonetization and its push for digital cash is as much or more about legitimacy as they are about governing [34, 66]. The positive perception of demonetization as a social good among the shopkeepers, despite the perceived negative effects on their own self-interest, underscore the purchase for the ideas engendered in the initiative as something more than its objective effects alone. To accept demonetization is thus patriotic since it is a willing subservience of one's own good for the common good. Conversely, denouncing it engenders rejecting the modernity and developmental vision it represents.

As with other transformative proposals for technology-led development such as 'Digital India', the object of a nationwide initiative must be a relatable citizen. In a country in which 50% of the population relies on some form of government assistance, the 'common man' argument emerged in the characterization of small vendors as potential technology users, by the prime minister himself, but also in its successful echo in the words of our respondents. The poor, often excluded, small trader or street vendor, as an object of techno-rationality [24] emerges as a symbol of the modern potential. The cashless economy thus represents a continuum from Aadhaar that digitally defined the citizen, to demonetization as a framework for the citizen to transact.

But as we see in this case, moving a citizenry to digital identity represents a largely one-time challenge of enrollment, whereas digital cash exchange requires a consistent buy in both by the individual agent and the ecosystem in which they operate. Here, the choice of the young, urban Indian as a proselytizer of technology to 'parents and uncles and aunts' in Modi's speeches presents a message about the future that did get it right in some ways. As we find for our respondents, children do indeed impact their parents' decisions related to digital cash.

Beyond the symbolic use of young tech-savvy Indians, the use of emotional appeal became a hallmark of Modi's post-demonetization appearances. While these may not have ended up dramatically impacting digital cash adoption, they do play a role in humanizing the process. In his characterization of the poor, average citizen, Modi appeared to be an emissary for HCI4D, proposing that not only is the use of technology possible for the average Indian, there are simple enough interfaces and applications that already show this as true. He uses specific language – WhatsApp, forwards, features, alongside specific populations – washermen, tea stall owners to underline the accessibility of this vision.

And, this procedure is as simple as sending messages through WhatsApp. Even an illiterate person today knows how to send and also forward WhatsApp messages. Not only this, with the simplification of technology, we do not require any big smartphones for this purpose. Cash can be transferred even with a phone with ordinary features. A washerman, vegetable vendor, milk supplier, newspaper vendor, tea stall owner or a chanaa vendor, everyone can easily use this facility. – Narendra Modi [8]

The language of persuasion aside, what we found in our empirical study is that in the long run economic actors must resort to the flexibility of informal institutions to find solutions that cushion the impact of technology directives like demonetization. Through leveraging familiar elements such as personal networks and materiality, people attempt to balance the uncertainty that accompanies any new technology. For our respondents, the cost of arbitrage — percentages charged by credit card or online payment companies — was something new and yet necessary to receive buy-in. Added to this, the materiality, sense of safety in completing a transaction, and control over one's resources mattered to people. Unlike products like M-Pesa, which operate in similar political and economic settings, the lack of a core community that needed to start using it (migrants) and the lack of a culture of paying small percentages for transactions affected uptake of electronic transactions in India. Yet we also found here the ways in which social and economic inequalities mean that marginalized sellers and buyers who do not have strong ties to a community and do not have long-term economic relationships are at particularly high risk. Further, heavy-handed top-down coercion of technology by the state leads to tensions and mistrust.

The role of gateway technologies such as WhatsApp and motivators such as family members being online are important indicators of people's choice to integrate technology into their everyday practices. Research on adoption behavior has recognized that, in many cases, several technological innovations that have various degrees of complementarity are introduced simultaneously. Therefore, the adoption decisions for various innovations are interrelated [23]. This analysis can be complicated by the fact that quite often various interrelated technological innovations are introduced over time in a partially

overlapping manner, creating a lasting disequilibrium. So in addition to mobile payment apps, direct transfer through banks, for instance, is also in play [23].

The effects of this are disproportionate — they are much worse for those who are poorer or highly reliant on cash and therefore not likely to be early technology adopters. Those who are actually creating value are the ones affected, as opposed to those who are just consuming. There is also a path dependency: those who already use digital transactions are more likely to use them more in such a scenario. Cash is intrinsically woven into the fabric of everyday life in India; this does not suggest that cashless transactions are infeasible, just that for the population targeted, and the scale targeted, the markets are not ready.

CONCLUSION

Our analysis of how shopkeepers coped with demonetization gives descriptive insight into the nature of technology adoption in state-mandated decisions. We found that digital payment adoption increased immediately following the crisis but fell after new banknotes became available. The participants in our study who continued to use digital payments did so based on the nature and scope of transactions, type of product they sold, and personal factors such as comfort and familiarity with other digital technologies and transactions. We found that when technology adoption pushes against existing practices it is resisted; such adoption should be examined within the larger context in which it is taking place because it is not solely about the user experience or platform.

The work on HCI4D has long looked at technology adoption either from the perspective of people's needs and abilities or from that of socio-economic drivers. This research shows how a political agenda, enacted through a technological intervention, can be a lens into people's acceptance or rejection of artifacts. We found that markets and entrenched practices are important considerations and that networks have effects on whether people try new things. We found that existing comfort with digital technology is an important indicator of new technology adoption, which further suggests that the information-poor and those with limited access to technology are less likely to be users. This, in turn, raises questions about the idea of technology and modernity and the scope of new technologies to change lives. The critical failing of the Modi government was that while it made a number of sentimental appeals for technology adoption, it provided little compelling evidence that the cash economy was bad for people. On the contrary, respondents suggested the reverse was true.

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