Market Practices and the Bazaar: Technology Consumption in ICT Markets in the Global South

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ABSTRACT
Local informal markets or bazaars play a central role in embedding the adoption, consumption, and reproduction of digital technologies within the economic and cultural fabric of the Global South. This paper presents ethnographic accounts of informal ICT markets in two sites, one in India and the other in Bangladesh, and assesses how technology consumption unfolds within local practices. Building on social practice theory, this paper depicts the role of materiality, relationships, and situated knowledge in the functioning of a bazaar. We discuss how this knowledge expands our understanding of the evaluation of technology and technical expertise, and the persistence of these informal spaces despite the uptake of corporatized technology marketplaces. We argue that the bazaar represents a special kind of local voice that enriches the HCI scholarship in postcolonial computing.

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Practice Theory, Informality, Markets, Bazaars, Global South, Postcolonial

ACM Classification Keywords
H.m. [Information systems]; Miscellaneous.

INTRODUCTION
The majority of technology consumption in the Global South happens through informal technology markets (or bazaars) that dot the urban landscapes. These are the primary locations where low- and middle-income customers are introduced to new and existing technologies, where they contemplate their purchases of technology goods and services, and where they subsequently come for the repair and reuse of technology goods. Despite their importance in shaping technology consumption for a significant demographic of the population, little sociotechnical research has focused on such markets. Research on markets has primarily focused on electronic commerce – specifically the dynamics of online business environments. While online retail stores are ubiquitous in the industrialized world and increasing their presence in the Global South, the dominance of informal technology markets across these regions indicates patterns of technology consumption that are historical and contextual.

In this paper, we examine the ways in which technology consumption in informal ICT markets is a consequence of interweaving socio-technical systems, and how the stability of certain practices helps sustain these markets in the face of rising challenges from the corporatized sales ecosystem. To do so we use practice theory, a strand of cultural theory that offers a conceptual framework that repositions notions of the individual and social. In this paper, we consider practices as the primary unit of analysis, with individuals and technologies acting as carriers of the practice. We subsequently extend socio-technical research to analyze how the consumption of technology unfolds within existing practices in these informal markets.

We study two informal technology goods markets that cater to low- and middle-income communities in South Asia - SP Road in Bangalore, India, and Gulistan Underground Market in Dhaka, Bangladesh. Through a controlled comparison of ethnographic studies at the two sites, we identify practices that help leverage social links and materiality to create a market environment in which consumers and producers get around local problems such as information noise through negotiations constructed upon situated knowledge. We subsequently argue that the social and economic practices that evolve in these marketplaces are an integral part of the cultural life of communities, and these practices of everyday life foster relatively stable predispositions that also dictate the consumption of new technology goods and services. We further discuss how this practice-theoretic approach to studying informal markets can contribute to emerging debates around postcolonial computing.

BACKGROUND

Consumption and the Theory of Practice
Practice theory and its relation to consumption have its origins in Pierre Bourdieu's [5] notion of habitus – stable internalized conditions of existence (or structure) that guide tastes, preferences, and subsequently, consumption. Practice theory moves the unit of analysis from individuals

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to the everyday practices that co-constitute individuals and their activities.

Reckwitz [42] extends the work of Bourdieu and other practice theorists such as Giddens [21] and Schatzki [43] by looking at practices as routinized everyday behavior. Reckwitz emphasizes the interconnectedness of several elements including bodily and mental activities, tangible objects, states of emotion, and socially shared ideas. Following applications of practice theory to consumption [34,45], we group these elements and consider practices as the result of dynamic linkages among the following three components: 1) the symbolic meaning of a practice to a user (or images), 2) technologies and objects that constitute the practice (or stuff), and 3) competences and ways of doing (or skills).

The consumption of goods necessarily happens within practices [51], with the multiplicity of (often intersecting) practices accounting for the diversity in consumption behaviors. Changes in consumption behavior correspond to the development of new practices. However, new practices are created only through new components diffusing into existing 'homegrown' practices or through reconfigurations of existing components from exogenous shocks.

Extending this to technology consumption, the contemplation, adoption, and use of technology products and services are guided by existing everyday practices. The inertia of these practices (i.e. their propensity to resist change) and their ability to evolve dictate the consumption behavior of individuals over time as well as within different socio-technical contexts.

Practice Theory and HCI

The lens of practice theory shifts the focus from the individual to the regular recurring and adaptive routines that they are engaged in, thus allowing us to assess how everyday actions shape social and economic life. It has found acceptance in organizational studies as a means to examine how organizational strategies [28] and knowledge [38] are dynamically (re)constituted through locally situated practices.

In HCI literature, practice theory has been useful in the analysis of everyday practices such as domestic consumption [22,46] and designing for sustainable HCI [40]. Designers have subsequently highlighted its effectiveness in the design of tools that attempt to influence consumption behaviors embedded in multiple practices and local contexts, such as energy conservation [48] and food waste [18]. Practice theory has also offered a valuable lens to look at materiality and its intersections with existing social and cultural practices, i.e. how material objects and space shape everyday life [20]. The inherent difficulty in identifying practices has led to the creation of frameworks that enable designers to identify and map practices in everyday life and subsequently design interventions built around these routines [13,41].

In this paper, we also contribute to HCI literature by positioning practice theory to enrich the growing body of work on postcolonial computing. We do so by addressing the values in design that sit at the core of technology. Practice theory is helpful in reconceptualizing the core assumptions of the Value Sensitive Design paradigm [17,37], which has for several years been a means of looking at stakeholder values and their effects on artifacts or technology design and adoption. However, practice theory criticizes the idea that values can be measured as a priori features, and can be fed to the design phase of an artifact. Le Dantec et al. [33] have shown how valuation actually takes place within the society as a social practice and is hard to predict in advance in the design phase. Very recently, Houston et al. [25] demonstrated how a society associates different values around the situated technical practices like repair and recycling that are hard for designers to approach. These studies position practice as the center of local production of value systems, and thus shift the focus from values to practices. This line of argument also resonates a longstanding critical strand within HCI that depicts the innumerable and unpredictable modes of failures and breakdowns of technologies, and how situated human practices approach them [49].

Taken together, practice-theoretic approaches emphasize situated practices in assessing the impact of a technology in society. In this context, they complement our understanding of concerns raised in postcolonial computing regarding the cultural and political impacts associated with transferring technology from the West to the Global South [26]. While a practice-theoretic approach aligns with the basic agenda of postcolonial computing regarding the functional mismatches and potential cultural and political impacts, it positions local practices in the Global South as the determining factor that resists the changes associated with a technology, both expected and unintended by the designers. Practice-theoretic approaches thus allow for a nuanced understanding of postcolonial computing that emerges from studying the potential impact of an imported technology on a local culture alongside the oppositional forces of local resistance.

Hence, this paper joins a rich ethnographic scholarship that has presented the strength of situated local practices in the Global South. For example, Jean Lave's [32] work with the tailor communities in Liberia revealed how apprenticeship is practiced to convey situated knowledge among their members. Kumar and Parikh's [30] ethnography in North India reveals the material practices around the consumption of digital music. Ahmed et al. [2] and Jackson et al.'s [27] work on the mobile phone repairers in Bangladesh portrays how local practices engender a rare form of skill and art in repairing. We demonstrate how the socially embedded practices in an informal market shape the procurement, evaluation, consumption, and maintenance processes for technologies. We also report how local culture, politics,

tradition, social resources, and situated material practices impact the practices around a technology.

Consumption and Markets

The acts of contemplating, purchasing, and maintaining a technology good play an important part in the consumption of a product. We thus focus on informal ICT markets that cater to low- and middle-income consumers in South Asia. These markets are what can be termed "consumption junctions" [9], i.e. where consumers are introduced to technologies, interact with them, and make purchase decisions. Further, they are the primary sites where these technology goods are maintained and repaired. We analyze existing market practices in two of these spaces with the understanding that consumption behaviors are embedded in these practices.

In this paper, we argue that economic transactions in such markets are deeply embedded in social relations [16,23]. Looking beyond economic transactions, the materiality and sociality of marketplaces around the world have been studied extensively by cultural anthropologists [8]. These studies – ethnographic and interpretive in nature – paint a rich picture of the everyday practices at public sites of consumption such as sidewalk sales [11], flea markets [44], and garage sales [24]. Influenced by Laguerre's [31] notion of the informal city that exists at the interstices of the formal city, we use the metaphor of bazaar to distinguish these informal traditional market spaces from the more formal retail spaces. It is not our intention to exoticize local markets in the Global South or treat them as deviant economic oddities; rather we identify bazaars in terms of their informality, either of the goods and services themselves or the ways in which they are transacted. The nature of practices found in these bazaars is subsequently a direct consequence of the local contexts in which these goods and services are sold.

Geertz [19] in his ethnographic work of the bazaars in Sefrou, Morocco, stresses that a key characteristic that differentiates such traditional local markets from formal markets is that information about goods and prices is scarce and local actors are aware of this. On similar lines, Fanselow [15] argues that the practices commonly associated with bazaars are a result of the uncertainty in quality because of the types of goods and services that are traded in such spaces. The subsequent emergence of market practices and social relationships is centered on the search for information, with the institutional structures in the bazaars either facilitating or hindering it. Two search procedures that Geertz identifies are clientelization and bargaining – both creating communication channels that allow actors to reduce uncertainty in their transactions. Clientelization refers to the continued adversarial yet reciprocal and symmetrical relationships between consumers and buyers that are a result of repeated interactions and accumulated social capital, while bargaining allows an in-depth exploration of a transaction by both actors. Other studies of bargaining in marketplaces discuss how it leads to the creation of lasting relationships in markets [29]. Such market practices steer technology consumption by playing an important role in how low-income consumers across the Global South interact with goods and services. We focus on local informal ICT markets, which are a recent phenomenon and have largely been formed by local economic actors tapping into the demand for global ICT goods and services.

METHODS

In this paper, we draw from two independent ethnographic studies at local informal technology markets; one in Bangalore, India, and the other in Dhaka, Bangladesh. We use the method of controlled comparison [12] borrowed from social anthropology; this method allows analytical comparison where conceptual units have historical and cultural similarities and is uniquely suited for narrow small-scale comparisons between different projects of fieldwork – particularly those with uneven data. Controlled comparison allows us to compare two ethnographic sites as long as the contextual variables are held constant – the method thus does not resort to universalization but rather limited generalizations that pertain to the specific contexts of our study.

Both sites are informal ICT markets situated in South Asia with comparable postcolonial histories and market cultures. Through an iterative process where ethnographers shared field notes and analyzed the data through the frame of practice theory, we narrowed the focus to existing practices and the components that constitute them. The process consisted of outlining everyday market activities that were comparable across both sites. We subsequently parsed the meanings that actors ascribed to these activities, the skills and competencies associated with performing them, and the objects that were integral to them. Through analyzing the relationships among these components we identified practices common to both sites.

The study in Bangalore was conducted by means of participant observation over 2 months from June 2015 through July 2015. Ethnographic observations were conducted at various locations at the market including the stores and informal service centers. This was supplemented by an exploration of the market and general "hanging around" [6] to get a higher-level view of the activities within the market. In addition, the researcher conducted numerous in-situ interviews to clarify understandings of market practices, with minimum interruption to the ongoing flow of activity. These observations produced a rich picture of the markets, the day-to-day activities of actors in the markets, and existing market practices. The observations were supplemented by 13 semi-structured interviews with various actors who were part of the market ecosystem and willing to talk to the researcher. These interviews included vendors, consumers, and law enforcement officials. Interviewed actors were predominantly part of the ICT

goods ecosystem at SP Road. All individuals interviewed were male – technology goods markets in South Asia are predominantly male-dominated with respect to both consumers and sellers. Most of the interviews at SP Road were in Hindi, which the vendors belonging to the Marwari community spoke proficiently, while interviews with non-Marwaris were primarily in English.

The study in Dhaka took place through a number of studies conducted between May 2013 and May 2015. In the first phase, we conducted a 3-month ethnographic study in Dhaka to understand the practice of repairing mobile phones from the point-of-view of repairer communities. From June to September 2013, we visited ten major electronic repair sites in Dhaka. In addition, during this period one researcher on our team spent time learning to repair mobile phones at a training center operated by a senior repairer. Following this, the researcher worked for 3 weeks in another repair shop as an apprentice. This allowed him to be deeply engaged with the community and learn the norms and values associated with mobile device repair. While working as an apprentice he also conducted 62 semi-formal interviews of individual repairers working in stand-alone workshops or as part of a group in a large workshop, including senior repairers, apprentices, repair customers, and electronic waste collectors. He also gathered notes documenting a huge amount of observational data, took photographs, and made videos. Between December 2013 and January 2014, he conducted another round of ethnography at the same ten sites. In this round, he studied 70 negotiations between customers and repairers at repair shops. In addition to documenting their conversations, he separately interviewed both parties after the negotiations and asked questions regarding the privacy of the data stored on the broken device and other related questions. All the interviews were taken in Bengali. They were later translated and transcribed, and coded into themes.

SITES OF STUDY

The Case of SP Road, Bangalore

SP (Sadar Patrappa) Road is the primary destination for low- and middle-income customers looking to purchase and repair ICT goods in Bangalore. Tightly packed buildings run on either side of narrow, crowded, and winding roads and alleys that intersect the main road. The matrix of chaotic and narrow roads is home to about 2,000 shops where a wide spectrum of technology goods – ranging from metal works and electrical components to high-tech laptops and tablets – are sold and repaired.

This case study primarily focuses on the ICT goods ecosystem at SP Road, though many of the observations are valid for other technology goods in the market. The area is renowned for its large diversity of ICT goods and services for prices cheaper than anywhere else in the city. Further, it contains a considerable number of service centers that cater to the local demand for affordable and customized service and repair.

Many of the major global computer hardware companies have opened official stores at this market; however, they stand out amid the older shops and there is visibly less traffic within these stores. The markets have continuously evolved, with local traders keeping track of changing ICT trends and customer demand. For example, in recent years the rise of demand for laptops, tablets, and mobile phones has been clearly reflected in the influx of shops selling and repairing them.

There also exists an alternative second-hand economy in the market, with used electronic devices such as laptops and desktops from around the city finding their way there for recycling. By leveraging extended social networks around the city, the service centers have been able to purchase old hardware discarded by IT companies for cheap. The systems are then either refurbished and sold to low-income customers or disassembled so that the components can be reused in repairing other systems. This is a useful means of getting older components that are no longer sold in the formal economy. It also allows service centers to work with components that are typically hard to buy. The costs of refurbished (or second-hand) ICT devices are substantially lower than those of first-hand devices, and together with low-cost repairs, the service centers help sustain an alternative ICT economy that caters exclusively to low-income customers.

The Case of Gulistan Underground Market, Dhaka

Gulistan Underground Market is located underground beneath the busiest neighborhood of Dhaka city in Bangladesh. Over the market run narrow city streets jam-packed with loaded vehicles, and sidewalks occupied by street hawkers. Four stairways at four corners of a busy intersection of Gulistan connect the loud, vibrant, and busy surface of the city to the dark, hot, and humid world of informal technology practice, the largest mobile phone repair market of the country. As much as this market is renowned for providing all kinds of supplies and services required for fixing mobile phones, this place is also notorious for cheating, pick-pocketing, and harassment. Nonetheless, this market hosts the finest repairers of the country and is always crowded by people with various mobile phone needs, either their own or for their business.

The market has more than 200 permanent shops. These shops include formal repair workshops, integrated circuit wholesalers, mobile accessories shops, mobile phone unlocking services, refurbished phone shops, and software service shops. However, the most salient feature of this market is probably the stalls of independent repairers who pay rent and set up in front of the permanent shops. Although the permanent shop owners lose a portion of real estate in the front of their shops, they end up getting customers who visit these markets for the sole purpose of repair. Along the narrow alleys of the markets, repair stalls beckon roaming customers, with their repairers inviting the customers to visit in loud voices. Here and there, food

stands offer fruits, juices, spicy popcorn, and tea. A number of beggars and buskers of varying ages can be found extending a pot toward customers with the hope of making some money.

The market is dark, hot, and humid, and the air ventilation system is not good enough to dissipate the odor of sweat. The crowd of customers adds to the loud noise that the repairers are constantly exposed to. This market is less frequented by "rich gentlemen," who get their phones fixed at formal service centers. This place caters to middle- and lower-class people whose consumption of technology largely depends on the repairing, refurbishing, and recycling practices of this informal market, and who deal in haggling, persuading, testing, and social resources.

Previous studies on Gulistan Underground Market have reported the skills, art, and craft of the mobile phone repairers [27], different learning processes involved in repairing [2], values in the repairing process [25], and privacy issues associated with broken electronic artifacts [1]. Likewise, at SP Road the social and technical infrastructure that underlie the market have been studied [7]. However, the practices around buying and selling at these markets have not been studied to our knowledge.

In the next section, we use ethnographic observations to trace some of the practices at the SP Road and Gulistan Underground markets in aggregate and occasionally in detail. Backed with customer interviews, we seek to understand why and how low- and middle-income customers purchase and repair technology goods in these ICT bazaars, even as online retail stores such as Amazon and other local players make major inroads into commerce life in the city.

MARKET PRACTICES AND TECHNOLOGY CONSUMPTION

The social and economic life at these markets manifests as a fabric of entangled practices, making the task of parsing individual practices a significant challenge. In this study we identified practices through focusing on three components (see Shove and Pantzar [45]): 1) images, which are the meanings that sellers and vendors ascribe to the various activities at the markets; 2) stuff, which represents the goods and services sold at this market; and 3) skills, which are both the know-how required to transact at the markets as well as observed activities. Through analyzing the dynamic performative linkages among these components, we identify some practices that are integral to these markets. Consumption, which unfolds within these practices, is a direct outcome of the interaction between these components.

Practices of Searching

SP Road is a crowded labyrinth of roads with a clear visible transition from formal to informal as one goes further from the main road with respect to goods and services. For example, deeper inside the shops no longer carry signs of branded logos, there are more service centers, and shops sell second-hand electronic goods. The customers that the researcher accompanied often struggled to retrace their steps to find previously visited service centers that were away from the main road. Touts could be seen patrolling the main road, attempting to guide new customers to the shops that were away from the main road, their overtures often ignored by customers who repeatedly reassured the touts that "they knew where they were going."

Both sellers and experienced customers reiterated that new customers need to be careful at the market, especially when dealing with shops away from the main road, to ensure that they don't get fleeced — either through overcharging or switching and stealing components from their electronic devices. New customers finding their way around the market often choose shops through recommendations from their social networks or through extensive price-shopping, where they explore multiple shops trying to find the best deal. Search costs correlated to walking distance play an important role in this process such that shops on the main road tend to get the majority of the business.

Interviewer(I): Why are the service centers usually so inside?
Service Center 3(S3): The rent is much lesser here. We don't do sales, so we have no need to be outside. The ones who know us come off here.
I: But do enough people know of your shop?
S3: We have some regular customers, for others they know they come inside and look.
I: But why do they come all the way inside?
S3: Because we charge much lesser, and we do good work. (Customer to his left nods in agreement). No one on the main road will do advanced repairing, only handle simple ones. We do the difficult work.

The inner roads are where most of the advanced technical work also happens, for example, motherboard repair and other services that are outside the gamut of formal service centers such as the installation of pirated software and jailbreaking of mobile phones. Thus, finding a good deal or service involves trade-offs with both search costs and risks.

In contrast to new customers, experienced customers have no difficulty in finding their way around this urban market. Through leveraging their prior experiences in the market and their existing connections, they are able to find good services at reasonable prices without facing any substantial risks. As we see in the next subsection, these search practices are intrinsically linked with clientelization practices because customers can use existing social capital to better navigate the markets.

This is also true in Gulistan Underground Market, where searching also requires local knowledge and familiarity with the place and the people. There are only four major alleys in this market, so finding a shop is not particularly challenging. What is challenging is to find the right person.

With hundreds of repairers sitting one after another, this offers a complex puzzle to customers, especially if they are new to the market. Young boys call the customers to their shops. The repairers, if not busy with their work, keep asking, *"Any problem with your mobile phone? Need to unlock? Broken screen?"* If customers are not familiar with the place and with any of the repairers, it is challenging for them to pick a particular repairer and trust that person with their valuable personal devices. However, familiarity leads to a different experience. The following case study from the fieldwork demonstrates how the situated practice of searching works:

> *Mr. S came to the Gulistan Underground Market to fix the iPhone that his cousin presented him last week. The iPhone shuts down suddenly every now and then. He does not want to hand this iPhone to some random repairer. He is familiar with this repair market for a long time now. So, instead of paying heed to the repairers calling him on the way, he directly goes to a shop at the very end of the market, and asks how he can get Mr. P. He comes to know that Mr. P does no longer sit there. But he collects Mr. P's phone number and calls him. He talks to him for a couple of minutes. He learns that Mr. P now sits on the other side of the market, and he only works in the afternoon. Mr. S thinks for a while whether he should wait that long, or come back after a couple of hours. Finally, he decides to come back later to the market and meet Mr. P.*

These and several such observations that the researchers found at the two markets demonstrate how search is practiced through local knowledge, personal experience, and social networks.

Practices of Clientelization

Repeated interactions between sellers and consumers, also known as clientelization, significantly reduce search costs for regular customers. The categorization of "regular customer" or "old customer" plays an important role in the market and differentiates those who have accumulated social capital from new customers. These customers are an important source of income for the sellers and were observed to receive extra discounts and more personalized service. Reputation at SP Road is primarily built through word-of-mouth and customer service, with none of the sellers publicly advertising. The limit of their advertising is a board outside the shop with their name, contact details and services offered.

> *Interviewer: Given that you are so away from the main road, how do you get enough customers?*
> *Service Center 2: I sometimes have someone who looks out for people outside and gets them here, but those who know me come to me directly. Customer relationship is important. If they trust me and I do good work, they will come back.*

With customer relationships highly valued at SP Road, sellers were observed going out of their way to make a customer feel comfortable — especially if the customer was someone they believed would be a long-term customer. The sellers usually knew multiple languages — switching seamlessly between Marwari, Hindi, English, and Kannada depending on the ethnicity of the customer. Lengthy transactions were accompanied by the seller offering the customer a beverage such as tea, which was delivered by a tea-seller on call.

Clientelization plays an important role in building familiarity between consumer and seller, and the buying and repair of ICT goods are deeply embedded in this social practice. For low- and middle-income customers who are making a major investment in an ICT good, this practice allows them to buy from a seller they trust and get better prices and more personalized customer service with respect to future maintenance and repair. Thus, for regulars at SP Road, the urban chaos that overwhelms new customers is transformed to a much more navigable social space partitioned between the reputable trustworthy sellers and the others. For sellers, it offers the promise of future business from the regular customers as well as new customers to whom they are recommended. With many of the sellers offering informal services that sometimes veer into illegal spaces (such as installing pirated software), it also allows for a more efficient vetting of customers. This is crucial because they have to be wary of police raids and sting operations.

Similarly, most of the customers interviewed at the repair shops in Gulistan Underground Market came there either because they were familiar with the repairer or they had been referred by their friends or relatives. One customer reported this: *"Mr. R is repairing the phones of my family for 10 years now. I used to live nearby, but now I live in Mirpur (2 hours' driving distance from Gulistan). Still, I come to him if I have any trouble with my mobile phones. I cannot trust any other person like him."* While interviewing Mr. R, the researcher heard similar stories. He said: *"I have a reputation in this business, and I have plenty of permanent customers. They will come to me for fixing their phone, and will not go to anybody else."*

The importance of clientelization to sellers is also apparent in the efforts they make to maintain relationships with customers. For example, Mr. A, a reputable repairer who also runs his own training center where he teaches mobile phone repair, also teaches his students how to build and maintain relationships with customers:

> *Customers are like your God. They bring you foods. Treat them with utmost respect. Every time you see them, offer them 'Salam.' Greet them with a smile. Ask them how they are doing. When you bargain with them, never show disrespect. If they say something offensive, don't respond to that. Your point of argument should be based on the labor you will put in, and the cost of the IC*

and materials you will need. If they want to pay couple of days later, accept that. If they are old, first arrange a seat for them. If they are woman, make your voice soft.

Clientelization at both markets is thus a reciprocal and symmetrical relationship that helps both customers and sellers reduce information noise in the markets: the sellers get repeat customers while the customers get trustworthy service. The practice helps create a more socially navigable space that is a direct result of local reputation and trust gained through repeated interactions and extended social networks.

Practices of Bargaining

Bargaining or haggling over price is a familiar sight in bazaars across South Asia. Unlike formal retail stores, such as branded computer showrooms, where the prices of ICT goods are publicly advertised and fixed, extended haggling between customers and sellers is the norm at SP Road. There, the practice of bargaining transforms information-seeking about price and quality into a social activity that embodies materiality, technical complexity, and existing social relationships between the negotiators.

The materiality of the ICT goods and services is integral to the practice of bargaining. This is especially true for services such as repairs, where the visible material complexity and the engagement of the seller play an important role in a consumer's valuations. Sellers spend considerable time explaining the amount of technical work that goes into a certain task and its complexity to convince the customer that the price is fair. Seller valuation was also a function of whether they perceive a customer to be a potential regular or someone who would return.

Invoking principles of fairness is common at the market. Sellers were often observed attempting to convince customers that their profit margins were low and that the price they were offering for an ICT good was fair, if not the cheapest. This was especially true for branded ICT goods that could be bought online for much cheaper prices. Customers, on the other hand, spend considerable time questioning the complexity of a service task based on their observations. The intense price competition between sellers and the ability to haggle prices in effect empowers customers, if only momentarily. Bargaining is an integral part of shopping at SP Road and it allows for customers to weed the trustworthy sellers from the untrustworthy ones. Sellers are able to use it to distinguish the customers with whom they can practice clientelization. For example, customers purchasing assembled desktop computers were observed going from shop to shop, enquiring the prices and having extended conversations with sellers, who filled out quotation sheets with the different components and their costs. Advice was dispensed by the vendors, and every component was debated, with discounts given at every step. Here the process of bargaining over price became a cooperative activity as sellers worked with the consumers to give them a desktop configuration that was most relevant to them with respect to their needs and budget.

The researcher observed haggling sessions that went on for more than 30 minutes, as every detail was assessed and discounts argued over. However, not all prices are regulated through bargaining; often the lack of elasticity to changes in supply and demand lead to fixed prices, and the vendors are clear and upfront about this. This was most apparent in goods that are sold at discounted prices by electronic retail stores such as computer peripherals, and vendors at the market lack the profit margins to bargain over them.

The study at Gulistan Underground Market also demonstrates how bargaining takes place in a very informal way. Besides customers price-shopping at different repair shops, they often argue with repairers for long periods of time. In most cases the researchers observed, the arguments from the repairers were based on the price of the materials they would need to reinstall to the device, and the time they would need to invest. They also brought in their expertise and reputation in their arguments. On the other hand, the customers brought various kinds of arguments, ranging from how insignificant the problem was to their familiarity with the market and people. The following excerpt, from a conversation during bargaining between a customer and a repairer at Gulistan Underground Market, shows the situated nature of this practice:

Repairer: This problem will take time to fix. You must leave the phone with us. My hands are full right now, but I can make some time for it tomorrow. It will cost 400 taka[1].
Customer: What are you talking about? The problem is so simple. The sound is just not loud enough. Why are you asking this much money to fix it?
Repairer: Look, I must change the faulty IC. That will cost at least 250 taka. Then there are costs for chemicals and electricity. I am not even counting my own labor, because I respect you.
*Customer: Would you cut this s*it? Do you think I am new here? You know Mr. Q, who has a shop down there? Ask him who I am. You should feel ashamed that you are asking 400 taka for such a simple task. Get this done for 100 taka. Don't talk much.*
Repair: I respect whatever you say. But I am not making any money here. I promise by God; the prices of the ICs have gone up. Go to other workshops and they will tell you the same. Nobody will get this done cheaper than this. OK, only since you are asking … out of respect, I make it 300 taka.

The various heuristics that customers and sellers use to value a good or service is visible in the following examples:

Mr. A teaches his students how to determine the price for a repair work while bargaining with the customer. He says:

[1] 80 Taka is approximately equivalent to 1 US Dollar

You should look at the mobile phone. Is it an iPhone? or a simple phone worth 2,000 taka? Look, both phones may have the same problem, and you may need to spend similar time and effort, but you cannot demand the same money for both. A person with an iPhone will happily spend 1,000 taka for fixing a problem in his phone. But for the person with a simple phone, you cannot go above 200 taka.

Mr. R, on the other hand, bargains based on the appearance of the customer. He told the researcher:

I look at the guy. If he is wearing a suit, if he is wearing a costly handwatch, then I know I can demand a good amount of money. But if I see him wearing a sponge sandal, I know he is not going to give me much money. It is pointless to argue there. Therefore, you must study the customer carefully. Even from their words, you can tell if they are educated, or they have money. Those are important clues for you to demand money.

This is certainly an adversarial process with negotiations often breaking off. However, the need for customers to build long-term relationships with people who will take care of their electronic device and provide service on a later date leads to softer styles of bargaining [24]. When both parties are satisfied with a transaction, it has the effect of building social relationships that can be sustained over time. Interviewed customers often mentioned that they revisited sellers who they felt had been fair in prior transactions.

Practices of Testing

A middle-aged South-Indian customer, speaking in Kannada, asks for a 17" monitor. M2 points at an HP monitor. The customer wants him to open the box so he can check it. While taking it out of the box, M2 guarantees the customers that in his 10 years of experience, he has never seen any problems with a monitor. The customer doesn't respond to M2 and patiently waits as M2 takes the monitor completely out of the box, removes the thermocol packaging and shows it. The customer holds the monitor and turns it around, examining every side of it. While he doesn't test it out, he appears to be satisfied by what he sees. He buys it for around (Rs.) 6000, in cash. Leaves with a receipt. – Researcher's notes (Bangalore)

As with bargaining practices, the material nature of the good plays an important role in the valuation of a good or service. The researchers observed customers examining electronic goods with a need to see them up close and in some instances physically touch them to gauge their quality. Tech-savvy customers would go further and test the components that they were buying or make the seller test it in front of them. The sellers don't discourage these informal practices of testing and it differentiates them from the branded retail stores, where demo pieces for ICT goods can be tried but the final piece is bought sealed, untouched and untested by the customer.

I don't like buying it online. There is no guarantee there. I know these people, they're straight with me. I can get my work done without any issue here. Online, I don't trust really. Also, here I can sit and watch as they repair my system in front of me. I like that. - Customer 2

Customer 2 had given his laptop for repair early in the day and was sitting on a stool in front of the service center for most of the day — it was a weekday and he had taken leave from work just so he could get the laptop repaired. He intended to sit there till the laptop got repaired and was willing to sit there until the evening when he would have to go pick his children up from school. This was a common sight at SP Road — people sitting on stools at the edge of the service center or standing by counters and watching as their electronic goods were repaired. The service centers even encouraged it, partly because it meant that they weren't responsible for the theft or any accusations of damage from the customers. This is in contrast to formal service centers, where the servicing happens behind closed doors with little transparency. As mentioned previously, watching the repair plays an important role in the valuation of the services and helps establishes a common "regime of value" [4] where negotiations are based on common observations.

Similar incidents of visual evidence and trust were found in the fieldwork in Gulistan Underground Market. In many cases, the researcher found that the customers were standing by the repair stalls while the repairers were fixing their phones. They were carefully checking each of the actions of the repairers. One such customer said to the researcher, *"You should not leave your phone to them. There are valuable parts in the phone that they can steal if you go away."* Another customer said: *"I don't trust them. They will probably give you a similar looking cheaper phone if you leave the phone with them."*

Customers were also concerned about how carefully the repairers were handling their phones. One such customer said: *"They often do not care about your phone. You may have come to them to fix a problem. They will fix that, but they will make seven scratches on the body. You have to tell them to be careful every now and then."* There were also concerns whether the repair task would be done by the senior repairer or be delegated to another person. One customer said: *"I came to this workshop because I want this phone fixed by Mr. R. I just don't want to let a newbie lay their hand on it. But if you leave the phone with them, he will get the repair done by some of his apprentices, and I just don't want that."* In one case, the researcher found an older woman who came to a repair workshop from Comilla, a district 4 hours of driving distance from Dhaka, to get her son's mobile phone fixed. The repairer told her that it would take the whole day to fix the problem, so she stayed at the workshop the whole day. She knew she would not be

able to catch any bus later that day, so she planned to stay at a nearby hotel that night and start for Comilla early the next day. The repairer suggested that she leave the phone with him and come back the next day, but she refused. She said, *"This phone is very expensive, and I don't want to go out of my sight even for a moment."*

The observation of repair tasks also fed bargaining in many cases. Although the negotiation of price would usually be done before the repairer started fixing the phone, often the customer would argue during and after the repair work. In one case, while the repairer was "reballing" the motherboard, the customer said: *"Hey, you said you would replace the whole IC with a new one. Now, you are fixing the old one. I am not going to give you the money you wanted."* Then the repairer had to explain that he was replacing the faulty ball and not the whole IC, which would cost a lot more. In another case, after the repairer had completed "jumpering," the customer said: *"It only took you 10 minutes, no? And you are taking 200 taka for this? Do you think I am a fool?"* Furthermore, after the repair, we found every customer checking the phone in all possible ways to make sure there was no problem. On several occasions, customers were unhappy with the condition of the phone and the repairer had to run the repair work again.

DISCUSSION

Informal ICT markets or bazaars have survived and in many cases out-competed formal retail stores for decades. Even with the influx of electronic retail stores in South Asia, these bazaars remain the primary destination for most urban low- and middle-income customers. These markets, as important consumption junctions that introduce customers to new and existing technologies while also actively shaping their preferences, are integral to the process of technology consumption. Parsing and analyzing existing market practices allows us to assess their role in the production and reproduction of social and economic life at these markets. A practice-theoretic approach to understanding ICT bazaars highlights the importance of engaging with everyday market activities to better understand market outcomes such as consumption. This holistic understanding of *how* and *why* people consume in certain ways has important consequences with respect to HCI design and postcolonial computing.

The four practices that we outline — searching, clientelization, bargaining, and testing — are arguably as relevant to digital economies as to physical bazaars, and these practices highlight the mutually constitutive relationships between everyday market activities and market outcomes. These practices are continuously reproduced at these bazaars, the constitutive elements dynamically interacting with one another, creating "circuits of practice" [34] within which the consumption of technology goods unfolds.

These practices are locally situated performances — very contextual, historical, and culture-specific — and are a direct consequence of everyday market activities, which often relate to finding ways around market problems (such as information noise). The stability of these practices is a result of their constituent components integrating themselves in similar configurations during performances. It is also during performances that practices can partially reconfigure, leading to changes over time. Practices are also created when new elements integrate themselves into existing configurations of practice. The path dependence of practices provides important implications for HCI research.

Traditional Markets and HCI

While we focus on informal ICT markets in South Asia, the insights we gain also help in analyzing other sites of public consumption (including those existing in the Global North). New design and technology interventions need to performatively integrate themselves with existing practices to be successful. Consequently, identifying existing practices is important to the process of design. Marketplaces — as a collective socio-economic entity that brings customers, sellers, and goods together into a single physical space — are thus rich sites for the study of consumption. Through holistically analyzing such physical spaces, we can identify existing practices that shape consumption. These can subsequently inform the design and management of new market environments that build upon traditional shopping experiences.

The high-profile entry of online markets looking to disrupt traditional marketplaces across the Global South brings to the fore questions on how these new markets will accommodate customers who are already ingrained in traditional practices. In our studies, we often found customers who didn't trust the online markets for a variety of reasons, ranging from not knowing who they were buying from to their need to physically examine a good prior to purchase. Thus, clients' comfort with or preferences for certain forms of searching, price arbitration, and product sampling, and their investment into purchase networks are each important elements of participation in online markets as well. From an instrumental perspective, these are helpful for a more granular understanding of how practices can reconfigure themselves in ways that may enable technology adoption around digital marketplaces. These preferences also highlight facets that clarify how interfaces can be designed so they diffuse into existing practices of users.

Market Practices and Design

The four practices we identify have intersections with existing HCI research and provide useful insights that can inform design interventions. The practice of searching has been extensively studied in HCI literature, with studies focusing on the broad spectrum of online information-seeking behavior. Relevant to our findings is the idea of social searching [14,36,50]. This can be either explicit, where individuals interact with others at various stages of the search process, or implicit, where recommendations are generated by algorithms that use socially generated

datasets. Our observations of searching practices at informal markets highlight the importance of local knowledge and how it is built through repeated interactions with the environment. A crucial component of design for communities would be to leverage local knowledge and relevant social networks to create more contextual search tools.

Further, understanding the role that social capital plays in building local reputation and trust – and subsequently reducing information noise – has important implications for design. The practice of clientelization leverages social capital to facilitate better and more intimate business relationships that are beneficial for all parties involved. While online reputation systems do attempt to create reliable trust systems that reduce seller uncertainty, they often lack the longevity that personal relationships present in informal markets that are stable and deeply intertwined with other market practices of consumers. For example, the purchase of assistive technologies by people with visual impairments is driven by historical practices where the marketplace consists of devices aggregated and sold through disability agencies or personal contacts despite the availability of online marketplaces [39]. The informal markets enable the practice of 1) testing the quality of functions on a device with assistive software, 2) using social networks as a failsafe in case devices have problems, and 3) arbitrating prices.

In the two sites of study, sellers and customers alike were involved in the practice of clientelization (along with other practices), and consequently, the customer was no longer central to consumption. This is in contrast to user-centered design and other interaction paradigms that build systems around users. In line with practice-theoretic approaches in HCI, we propose a broader approach to design that involves all actors and objects that constitute practices.

Last, we look at materiality, which plays an important role in the practices of bargaining and testing, and helps establish common ground with respect to the valuation of goods and services. Research has shown the role product uncertainty plays in the purchasing decisions of individuals [10], especially with respect to experiential goods and services, and our study highlights the importance of physical experiences during an exchange on terms familiar to both parties in a transaction. The dominant digital paradigm of removing uncertainty has focused on reviews of goods and sellers through multi-tiered online ratings. However, very little work has focused on what makes individuals comfortable with digital means of verifying product and seller reputation. Our paper highlights markets for material products in what is arguably a transitional exchange ecosystem as digital markets gain share in India; however, there is a range of goods and services where verifying the goods and those involved in the transactions relies on both traditional practices and forms of material reassurance. Our findings suggest that designers should reconsider what goods and services are experiential and how this classification depends on the socio-economic characteristics of consumers.

Voice and Postcolonial Computing

While practice theory facilitates a deeper understanding of how technology is unboxed, evaluated, used, reused, and recycled in a broad social and cultural context, it also deepens our understanding of postcolonial computing by emphasizing the voice of the locals in the global technology supply chain. While a thread in HCI is critical about the functional mismatches, cultural imperialism, and economic controls associated with the transnational movements of technologies [26], practice theory points out how local practices resist, refuse, internalize, and reshape a foreign technology and associated values. While these two perspectives are not necessarily orthogonal and both eventually converge on the importance of a situated practice of HCI, we argue that practice theory provides a more empowered representation of the voice of the Global South and highlights its strengths. This way, this research joins a growing body of HCI scholarship that brings out the strength of local art, craft, expertise, knowledge, and material practices in the Global South.

Instead of considering the local culture vulnerable to imperialistic attacks, this paper focuses on its beauty and ability, and emphasizes the impact of local practices that create, maintain, shape, and reshape the local culture. The practices around searching, clientelization, and testing, as described in this paper, demonstrate how the traditional practices dominate over encrypted and imported values. We believe that practice theory thus adds two valuable perspectives in postcolonial space for HCI researchers. First, the strength of the practices opens a novel platform for designing new products and services for local people. For example, practice theory can ask, “How can the social bonds between the repairers and the customers be used for the welfare of the repairers in Gulistan Underground Market?” or “How can the material practice of testing be used for detecting a fraudulent hardware in SP Road?” Research around such questions will advance the design of appropriate technologies for a community of practice.

Second, a practice-theoretic approach rejects all kinds of romanticization of local practices and emphasizes identifying the residuals [3], left-outs [35], and subalterns [47] within a local community. Hence, taking practice theory seriously will help the researchers find biases against women, differently abled people, and people from lower social or economic classes in many situated practices. This should help develop HCI scholarship in design, theory, and policy in the areas of intersectionality in the Global South. Thus, practice theory can help HCI researchers to find the elements of marginalization in these practices so they can design technology, policy, law, and education to promote more equitable practices.

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