Introducing ATMs in India: a contextual inquiry

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Abstract

This paper presents a method and results of an ethnographic study aimed at building an understanding of Automatic Teller Machine (ATM) adoption in Mumbai, India. The study combined field observations and semi-structured interviews (\(N = 43\)) of early ATM adopters, bank customers who do not use ATMs, and people who used the ATM for the first time as part of our research. Data were analysed to identify specific cultural traits that may affect the adoption of ATMs in urban India. Results demonstrated the unique role of the cultural context in affecting users’ expectations and behavioural possibilities, thus determining people’s response to the machine. This led to the conclusion that an understanding of cultural biases and metaphors can facilitate technology diffusion and acceptance informing design localisation and supporting the development of strategies to motivate and train users.

Keywords: Automatic teller machines adoption; Design localisation; Hofstede’s culture dimensions; Emerging market; Ethnography; Cross-cultural user research

1. Introduction

In many parts of the world the majority of bank customers regularly use Automatic Teller Machines (ATMs) and today’s Western youth have not known a world without them. For these people, the prevailing perception of a cash machine is that of a tool providing a familiar functionality of basic financial information and dispensing cash (De Angeli et al., 2002). The technology is hidden from sight; the computer is invisible.

It has taken approximately 30 years to establish ATMs as ubiquitous examples of public walk-up-and-use devices. The adoption has not been straightforward, requiring trust in
the technology and willingness to modify behavioural strategies in the very sensitive
domain of personal finance. Financial institutions have played a major, sometime
coercive, role in encouraging ATM adoption. Research has monitored this period revealing
major drivers and deterrents of adoption and basic usability issues (Stevens et al., 1986;
Hatta and Iiyama, 1991; Pepermans et al., 1996; Mead and Fisk, 1998; Little et al., 2003).
The ATM flourishes within societies where time is precious and money readily
available. This culture is composed of individuals, who have personal bank accounts and
access to a wide range of technology. For these people, ATMs are convenient and
reliable everyday artefacts: push a few buttons and get your money. As ATMs cross new
borders and pervade different cultures, we need to understand the role of cultural
characteristics on people’s perception of, attitudes towards, and action on, the machine.
This understanding is instrumental in facilitating technology uptake and improving
design localisation, or the process of infusing a specific cultural context into products
designed for different cultures (Carey, 1998).

This paper contributes to the understanding of technology adoption in developing
countries, reporting a contextual inquiry conducted in the city of Mumbai with the aim of
collecting consumer requirements for financial self-service technology. It discusses a
method and results of an ethnographic study aimed at building an understanding of Indian
ATM’s consumers. It concentrates on urban India and ATM adoption but we believe the
approach can be generalised to cover other public (and personal) technologies, as well as
other developing markets. Section 2 provides a definition of culture and a brief review of
research discussing how interface design relates to culture. This is followed by the user
research describing methods, analysis and results. The final section provides conclusions
and suggestions for further research.

2. Culture and design

‘Culture is to a human collectivity what personality is to an individual’ (Hofstede,
2001, p. 10). It is the common deposit of knowledge, beliefs, values and attitudes that
shapes people’s interaction in a society with their physical and social environment.
Applying this definition to the interaction with a machine, culture has to be regarded as a
powerful variable affecting users’ expectations and behavioural possibilities,
thus determining people’s response to that machine, including misuse or no use at all.

The Human–Computer Interaction (HCI) interest in culture is growing (for instance
see Del Galdo and Nielsen, 1996; Nielsen, 1990; Day, 1998; Gunter et al., 2003). HCI
communities have been established almost everywhere in the world, and have started
addressing specific issues of developing markets such as illiteracy and limited
infrastructures (Shneiderman, 2000; Interactions, 2003). The most relevant part of the
research has concentrated on a surface-level approach to interface localisation in the
implicit assumption that user needs and requirements were constant between cultures.
Today, it is commonly acknowledged that design elements that are appropriate for one
culture may not be appropriate for another. Cultural preferences and biases, such as
spatial orientation of information, colour semantics and cultural metaphors influence
usability. For instance, writing protocols affect menu design. Chinese languages
suit a vertical menu configuration, whereas western languages (left to right) suit a horizontal display (Dong and Salvendy, 1999). American users react quicker to alphanumeric labels, while Chinese users react quicker to pictorial icons (Choong and Salvendy, 1998).

A parallel research direction has concentrated on investigating the effect of cultures on user requirements, with particular attention to on-line behaviour and experience (Chau et al., 2002). It has been suggested, for example, that price negotiation would provide a more satisfying consumer experience for on-line shopping in Turkey (Lightner et al., 2002) and China (Liang and Dong, 2000), i.e. countries, which negotiate prices in real life. Group support systems for computer-mediated communication have different effects on different cultures (El-Shynnawy and Vinze, 1997).

2.1. Interface localisation

A recent and influential approach to interface localisation has advocated the mapping of Hofstede’s culture dimensions to user interface components (Marcus, 2002, 2003). From 1970 onwards, Hofstede’s work has analysed cultural values using extensive survey procedures in more than 70 countries (Hofstede, 2001). The author proposed five value dimensions, which have a significant impact on behaviour in all cultures and ranked the surveyed countries on each of them.

- **Power distance** is the extent to which the weaker members of a society accept inequality in power.
- **Uncertainty avoidance** is the extent to which a society feels uncomfortable with unknown situations, ambiguity and uncertainty.
- **Individualism versus collectivism** refers to the relationship between individuals and groups. Individualistic cultures consider individuals as core of the social structure and expect individuals to look after themselves. Collective cultures stress the importance of groups and expect members of a group to support each other.
- **Masculinity versus femininity** refers to the distribution of emotional roles between genders. Masculinity stands for a society where gender roles are clearly distinct (e.g. men are competitive and tough; women are caring and social oriented). Femininity stands for a society where social gender roles overlap.
- **Long-term versus short-term orientation** refers to the extent to which members of a culture are willing to accept delayed gratification of material, social and emotional needs. Long-term orientation encourages virtues oriented towards future rewards. Short-term orientation promotes virtues related to rewards at the present time.

Marcus’s proposal is to map these dimensions to the design of user-interface components, such as metaphors, mental models, navigation, interaction and appearance. An initial mapping has been proposed (Marcus, 2002). Combining power distance and interaction, it suggests that high power-distance cultures prefer severe error messages (e.g. *Entry forbidden*), whereas low power-distance cultures prefer supportive error messages. Combining uncertainty avoidance and navigation, it suggests that high
uncertainty-avoidance countries prefer limited options and simple controls, whereas low uncertainty-avoidance countries prefer multiple options and complex controls. Marcus’s approach is efficient, since it relies on a consolidated cultural model and on insights from web-site inspections or subject-matter experts to provide suggestions for interface localisation, but deals only with surface-level design issues.

A different but complementary approach proposes a top-down methodology to identify cultural markers in web site design (Barber and Badre, 1998). A systematic usability inspection of several hundred web sites elicited those elements that are most prevalent within a particular cultural group and absent or less prevalent in others. This approach has the merit of providing a large data set of format, symbols, icons, colour, flow, text, and script inherent in web-sites from different cultures, but once again it deals only with surface-level design issues and may not be sufficient for making explicit design decisions.

2.2. User requirements for emerging markets

Emerging markets open new challenges for HCI research increasing the risk of ethnocentrism. This is the tendency to evaluate other people and cultures according to assumptions and ideas originating in one’s own culture and represents a normal phase in the development of every discipline addressing cross-cultural research (Fauchex, 1976). Ethnocentrism in social research can subtly affect data collection, analysis and the dissemination of results. In HCI it can lead to misuse of evaluation techniques and improper generalisation of user requirements. Recently, usability methods have started to be adapted to culture specific parameters (Yeo et al., 1998). Conversely, less emphasis has been devoted to understand user requirements in countries which not only have different cultures from where the technology has originated, but which also are at different stages in the technology adoption process.

A surface-level approach to interface localisation in the emerging market may miss fundamental differences in user requirements, such as those highlighted by Singh and Joshi (2002). Based on findings from field studies, these authors identified unique user requirements for Internet search engines in rural India. Their studies indicated that farmers created queries which asked 'what went wrong’, or presented a brief description of the ‘effect’ of a destructive event. Farmers assumed the search engine had knowledge of their current context (e.g. location or a recent event) to answer this vague question and rejected generalised search findings that did not immediately apply to them. These behaviours demanded a completely new approach to the design of search interfaces, which could not be achieved by localisation of interface elements.

There is little published research on the use of a proper user-centred approach to the localisation of existing technology for emerging markets. Local communities may have developed a number of methods to support user-centred design in their cultures, but these methods are not always easily accessible to foreign researchers. This is the case of India where the importance of a user-centred approach in both education and practice dates back to the 1970’s, when the so-called ‘barefoot designers (Papanek, 1999) worked to improve the lives of the majority of the Indian population creating simple everyday products which were either cheap or which people could produce themselves (Athavankar, 2002).
This paper contributes to the understanding of technology adoption and research methods in developing countries, reporting a contextual inquiry conducted in the city of Mumbai with the aim of collecting consumer requirements for ATM design. It aims to demonstrate the relative importance of cultural theory and user research to provide requirements for interface localisation.

3. Project overview

In India, ATMs are being introduced on a large scale for the first time and we must understand these new users who live within a culture, which may bring new factors into the adoption curve. As HCI researchers and designers our interest was in the understanding of these factors and in using them to inspire localisation of interaction design, marketing and training. From a methodological standpoint, the project aimed to understand what (if any) specific user research was needed to understand and steer ATM adoption in India. The high-level research questions for the project was ‘Can Hofstede’s value dimensions be used to directly predict acceptance and usage of ATMs in urban India?"

The Advanced Research and Technology group of NCR Financial Solutions Group carried out this research project in collaboration with the Industrial Design Centre (IDC) of the Indian Institute of Technology of Bombay. The project was based on an ethnographic approach: a qualitative research process aimed at cultural interpretation. Ethnography is a broad-based, data-driven method, starting from the observation of people’s everyday activities. It is a contextual and holistic approach, which aims for depth rather than coverage. Researchers immerse themselves in the environment, observing, talking to people, and experiencing their life.

4. Method

Setting up a cultural project at a distance is a complex task. It does not only require defining tools, processes and procedures for user research, but also helping those not belonging to the culture to gain an understanding of the research findings inside a specific culture in a limited amount of time. Our team was composed of three HCI researchers in the UK with a strong experience in the domain of public technology and three designers in India with a strong understanding of HCI. The project consisted of four phases: (1) the background research, (2) contextual inquiry used for data collection, (3) analysis, interpretation and modelling of findings resulting in the generation of a consolidated cultural model, (4) consolidation and guidelines extraction.

4.1. Background research

The first phase of the project lasted approximately one month, and involved the team in the UK. The researchers had to review previous research and to learn about the culture itself. This meant not only covering the traditional literature resources, but also general information about Indian culture and lifestyle. Rich information was obtained via a few
interviews with people from India, now living in the UK, e-mail dialogues with NCR employees in Mumbai, discussions with employees who had taken part in earlier work with Indian banks. Naturally, this approach allowed us to build only a superficial knowledge of Mumbai, but it was enough to steer and initiate the project. Suitable partners to support the research locally were found at this stage.

4.2. Contextual inquiry

Before beginning data collection, one member of the UK team spent a week in Mumbai to gain first hand knowledge of the environment, kick off the project, and take part in a number of field observations. The design team in India collected the main data using the technique of contextual inquiry (Beyer and Holtzblatt, 1998). They communicated with the UK via e-mail, conference calls and sent as much visual information (videos, pictures etc.) as possible throughout the entire process of data collection.

At the beginning of this phase a research methodology was defined and structured interview schedules formulated and piloted ($N = 5$). A variety of bank branches and ATM installations were monitored. These locations captured a good spread of the Mumbai population, covering people from different social and literacy backgrounds. Observers recorded physical movements (queuing and actions) and social interactions (‘small-talk’ and task-based conversation) throughout the financial transaction. Interviews addressed people’s everyday financial management, expertise with technology, exposure to and attitudes towards ATMs, concerns and expectations. The interviews involved 43 bank customers. The ATM users ($N = 20$) were invited to describe their learning period, the reasons behind using an ATM and behavioural modifications due to increase in expertise. The non-users ($N = 23$) were invited to discuss their opinions of ATMs. Some of the non-users ($N = 7$) were also invited to try out an ATM in a controlled environment.

A team of three Indian researchers conducted all of the observations and interviews. One researcher asked questions, in the language preferred by the interviewee, the others observed and asked any impromptu questions arising. Interviews were recorded and, where possible, photos or videos were taken. First-time users were given specific tasks, they discussed the process with the researchers and their interaction with the machine was video recorded.

4.3. Analysis and modelling

One of the biggest difficulties in this project was bridging the cultural gap between Indian interviewees and UK researchers. Effort was devoted to developing communication tools, which could help people who were not familiar with the Indian society understand and elaborate research results. The Indian researchers created a generic set of user profiles describing an average 30-year-old male in six social classes (lower, lower–middle, middle, upper–middle, upper and upper–upper). Each of these simplified personas was described in terms of behaviour patterns, goals, skills, attitudes, and environment, with particular attention to financial background, typical possession, and values. Interviews were summarised in individual reports, including:
◆ **Analysis:** individual characteristics of the respondent (including pictures and a description of social/economic background linked to the general profiles) and summarising responses to main thematic areas;
◆ **Cultural models:** graphical representation reporting influencers (entities which affect acceptance and use of ATMs), their strengths and mutual relationships;
◆ **Physical models:** describing the environment where the interview was conducted and capturing any peculiarity of the physical surroundings and locations with respect to ATM or bank usage;
◆ **Insights and design ideas:** major findings from the specific interviews and design ideas generated from them; and
◆ **Interview transcript.**

This approach linked insights to design ideas at an early stage of data analysis, thus removing some of the problems reported in other work (Dillon, 1998). The advantage was an in-depth-analysis of each individual user, who was treated as a persona to steer the design.

### 4.4. Consolidation and guideline extraction

The huge amount of information gathered during this study was consolidated into a coherent description of ATM usage in Mumbai. Two parallel and independent approaches were followed in India and in the UK. The Indian team had less difficulty in understanding the cultural setting but less background knowledge on public technology. The UK team had strong background knowledge on public technology but had to rely on the specific communication tools prepared in this project to understand the specific culture.

An affinity diagram was built in India following the methodology suggested by Beyer and Holtzblatt (1998). It organised all the insights, design ideas, and cultural influencers gathered during interviews into a smaller set of common issues and themes (Fig. 1).

![Fig. 1. Building the affinity diagram.](imageLink)
The affinity diagram led to 10 top level categories including perceptions of ATMs, banking habits, what people do while waiting in banks, and social and language barriers to banking. The affinity analysis also revealed some interesting contradictions: for example two women, one young computer programmer, and a middle-aged professor-both wished to resist temptation, but their strategies were opposite. The younger woman thought that carrying cash was a temptation and routinely used the ATM to only withdraw as much as she needed just in time. The older woman thought that having 24 hour access to cash was a temptation in itself.

A content analysis was performed on the interview reports in the UK, to create a consolidated cultural model (Weber, 1990). It illustrated the common cultural aspects that pertain across the customer population and highlighted the main variables affecting ATM adoption in Mumbai, with particular attention to major factors differentiating it from other markets (De Angeli et al., 2003). The two approaches (affinity and content analysis) were then discussed, compared and findings merged.

The last, and most challenging, step of the project involved the dissemination of the findings inside NCR to increase corporate knowledge and inform business strategies. Several workshops and presentations were organised, involving designers, marketing experts, and market strategists. This activity was aimed at translating consumer requirements into design, marketing and training requirements. At this stage, video was an effective tool to share the knowledge gathered during the research.

5. Results

Providing a summary description of ‘the average’ attitude towards technology and ATMs in Mumbai is a difficult task. This is because Mumbai is a complex culture dominated by a number of different sub-cultures and user profiles are unlikely to do justice to such diversity. At the same time, Mumbai has developed a specific metro culture, being one of the most dynamic, technologically developed and westernised Indian cities. These results may not generalise to other places in India.

Merging findings from the affinity and the content analysis, identified five main dimensions which are likely to uniquely shape the process of ATM adoption in Mumbai. Three of them could be related directly to Hofstede’s dimensions: power distance, individualism–collectivism, and long–short term orientation. The remaining two factors referred to specific communication boundaries hampering written communication in India and to the intrinsic reality of developing markets, where advanced technology meets technology illiteracy.

Table 1 reports index scores (in bold) and ranks out of 53 countries (in brackets) for Hofstede’s value dimensions in India, UK and USA. This illustrates the dimensions where India varies from the western countries with high ATM adoption (represented by UK and USA).
5.1. Power distance

Despite the caste system being forbidden and the Government operating a positive discrimination policy towards the lowest classes, India is characterised by a well-defined social framework that clearly differentiates people according to their social class. Relationships between classes are regulated by strict unwritten rules. Upper and lower class people live parallel lives with minimum overlap. This cultural trait was found to influence many aspects of financial behaviour.

In India there are four types of banks, each of which serve a specific customer base. People from within social groups tended to choose a specific type of bank. For example, co-operative banks were preferred by middle and lower-middle class people, whereas foreign banks were preferred by the higher class people. Terms of conditions for opening accounts varied between banks requiring different minimum deposits. Proximity to a branch was also a major factor affecting the choice of a bank and had high correlation with social status (e.g. foreign banks are always in upper class residential areas).

Class was a powerful predictor of ATM adoption. The general perception of ATMs was that of a technological device for rich, educated people, living a busy life, rather than as a commodity for everybody. In a high power-distance society this image is critical, because it strongly affects people’s beliefs about their self-efficacy and thus their likelihood to adopt the technology. Non-users perceived ATMs as alien technology, something, which could not fit into their lifestyle. Most of them told us ‘ATM is not for me’ either because it was considered to be ‘for richer people’, for ‘people with a better education’, or for ‘younger people’. We also found three people that, despite the massive advertisement campaigns surrounding ATMs, did not actually know what these machines were.

Access to the ATMs in India was influenced by social constraints. Most ATMs in Mumbai are enclosed in kiosks of about 100-square feet. These sites represent a ‘virtual branch’ and are frequently protected by a 24 hour security guard. This is not uncommon in India, where every upper-class home, shops and most self-service devices have a guard-from phone booths, to elevators in public buildings. Protected locations appealed to the higher segment of the population but discouraged some potential users from lower classes.

Among users, the attitudes towards the ATM were very positive, reflecting both the class status symbol and what was perceived as a more ‘progressive approach to life’. Learning to use an ATM was regarded as an important self-achievement eliciting a positive

Table 1
Value dimensions index scores and ranks (Hofstede, 2001)

<table>
<thead>
<tr>
<th>Country</th>
<th>Power distance</th>
<th>Uncertainty avoidance</th>
<th>Individualism/collectivism</th>
<th>Masculinity/femininity</th>
<th>Long/short term orientation</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>77(10–11)</td>
<td>40(45)</td>
<td>48(21)</td>
<td>56(20–21)</td>
<td>61(7)</td>
</tr>
<tr>
<td>UK</td>
<td>35(42–44)</td>
<td>35(47–48)</td>
<td>89(3)</td>
<td>66(9–10)</td>
<td>25(28–29)</td>
</tr>
<tr>
<td>USA</td>
<td>40(38)</td>
<td>46(43)</td>
<td>91(1)</td>
<td>62(15)</td>
<td>29(27)</td>
</tr>
</tbody>
</table>

5.1. Power distance
emotional reaction. During the learning period, people tended to establish an affective bond with the ATM, and were likely to encourage friends and relatives to use it. A girl told us she had kept her first transaction slip as a souvenir, a lower class user referred to the PIN as a gupit (a Marathi word often used by children to refer to secrets). Bankcards were perceived as valuable possessions that should be protected. Most of the participants considered it more precious than money. This was exemplified in the way first time users held it (just on the corners as a photograph preventing damage).

Despite being incorporated into this well-defined social structure, ATMs were also found to have the potential to transcend linguistic, social and gender barriers typical of the Indian society. We have evidence of lower class, illiterate people who were users and preferred the ATM to the teller, because it allowed them to conduct their financial transactions without having to write as the ATM requires no forms or signatures. These customers appreciated the ATM because it avoided face-to-face contact with bank staff from higher social classes or of opposite gender (inter-gender occasional interactions are unwelcome by conservative Indians).

5.2. Collective orientation

India is a collective culture, where group affiliations take precedence over individual goals, and members of a group strongly support each other. An active informal economy parallels the banking sector: borrowing between friends and relatives is common. This cultural trait had a strong influence on ATM usage. Primarily, it tends to inhibit the need for cash machines, because people can rely on a consolidated social network to borrow cash from. It also affects the way people use ATMs. We found several instances of people sharing their card with friends and family, or deciding to adopt ATMs to facilitate money transfer between group members in different geographical locations (different cards accessing the same account). We also have a report of a migrant who gave his bankcard to friends visiting his village, so that his mother-in-law could withdraw money and then send the card back to him.

Word of mouth and encouragement from family and friends were major drivers to adoption. Social support was actively sought during the learning stage. The majority of the user sample approached the ATM with relatives and friends to receive training and/or encouragement, until they felt entirely confident using the machine. Only 8/20 users declared that they approached the ATM alone the first time they used it. Three of these people, however, asked for help from other customers or the guard. Learning was generally a group experience, which helped control the anxiety induced by the interaction with the machine. Almost, the entire user sample told us they had introduced somebody else to the ATM.

The collective orientation also implied an extended idea of privacy. Financial information was not considered as sensitive within a family as it is in individualistic cultures. From observations of queuing behaviour at ATMs and banks it also emerged that personal space expectations were smaller than in individualistic cultures.
5.3. Long-term orientation

Thrift, perseverance and patience are major virtues in long term orientation societies. These qualities affect the way people are willing to change well established behavioural patterns and affect people’s perception of time and waiting (Levine, 1997). For most middle and lower class Indians, queuing at a bank was perceived as a normal part of finance management. On average, people reported waiting almost half an hour, ranging from 5 min to one hour. Nevertheless, only a few non-ATM users belonging to the upper classes explicitly complained about it. The others perceived queuing as a routine, which had even some pleasant aspects, such as socialising. A middle age, middle class woman who declared normally waiting from 15 to 30 min, answered a question about queue times with the following words:

‘Yes, but what to do? … I keep waiting and if I meet someone then I talk’.

For middle-lower class Indians saving time was not a major concern, hence it will not be a major driver of ATM adoption. However, time perception and its relative importance strongly differed between social classes. Higher class people sent their maids to the bank, this included withdrawing money at the ATM. Some received preferential treatment from the bank, with bank staff visiting their home. These people still appreciated the convenience of ATMs. This appreciation may be a reflection of the ‘on-the-move’ culture in Mumbai, rather than a reality all over India.

5.4. Communication boundaries

Written communication in India is hampered by illiteracy and language variety. Some 35% of the population is illiterate and the percentage rises to 46% among the women (Census of India, 2001). Hindi is the principal official language but the Indian Constitution recognises another 17 official languages. English has the status of an associate language. It is common among educated people and is used for official and administrative purposes. In addition, there are hundreds of other languages and dialects.

Despite this multilingual context, English was the favourite language of ATM interaction. All the users told us they used the English interface, independently of their knowledge of the language. Three main factors appeared to be responsible for this.

- **Exposure.** Specific banking terms are usually in English even during Hindi conversations. Furthermore, customers in Mumbai normally prefer completing English forms, but may actually write in their local language. English is the common language among educated middle and upper class people in Mumbai-particularly non-Marathi speaking communities.
- **Association.** English is perceived as the language of technology. There is not even a name for ATM in Hindi.
- **Poor translation.** Indian language interfaces (Hindi and regional languages) appear to be confusing because of poor translation and lack of native words to refer to certain transactions. Referring to Hindi interfaces, a participant commented
‘the Hindi used is completely different from the one we speak’.

Even illiterates and semi-literates users who learnt to operate the ATM by memorising the key sequence told us that they preferred English as the interaction language. This finding is better exemplified in the following conversation with a hawker (a hawker refers to a person who sells items on the street).

Interviewer: What language do you use for transaction?
Hawker: English.
Interviewer: You have studied till what stage?
Hawker: Till ninth/seventh grade.
Interviewer: So did you face any difficulties in using English?
Hawker: Initially, Raghuram explained to me. Just for one day.
Interviewer: What is your mother tongue?
Hawker: Kannada.(…)
Interviewer: So will you prefer Kannada interface?
Hawker: No, I will prefer English. Wherever one settles, one picks up the language (…)
Interviewer: So will you be able to read ‘Savings Account’ in Kannada?
Hawker: Not very quickly.

5.5. Developing markets

In the western world, ATM customers and technology have matured together. As the users’ experience grew, the number of services available also increased. Indian customers have been exposed directly to advanced interaction techniques, both in terms of the number of services available and the complexity of the interface. Indian ATMs offer a broad range of services (e.g. marketing information, mobile phone payments, bill payment and the very unique option to make temple donations), much larger than that currently provided, for instance, in the UK.

Indian ATMs were difficult to use, because this range of services was designed with little attention to usability. For example, most ATMs offered three possibilities for withdrawing: cash withdrawal, fast cash, and ultra fast cash. The difference lay in the way the transaction was completed using the keyboard to type in an amount, receiving a fixed amount or selecting from amounts displayed on the screen. In reality, very few users understood the difference and most of them tended to use only one option, the one they had first learned. Advertising on ATMs was also common. These advertisements had substituted the machine feedback leaving the user without feedback on their last action. Furthermore, the content of the advertising was normally very western, upper class-oriented, thus increasing the psychological distance between ATMs and many Indian customers.

The generalised low exposure to other types of technology also increased the difficulty of the interaction, hampering the transfer of mental models across different technology channels. For instance, in India there are few other self-service public devices (such as pay phones, gates, or vending machines) operated by cards.
6. Discussion

Our study has provided further support to the idea that objects acquire meanings and values in the environment where they are placed (Bourgess-Waldegg and Scrivener, 1998). The general western idea of ATMs as simple devices to fulfil basic financial tasks (De Angeli et al., 2003) is completely different from the Indian idea of ATMs as advanced technology, a status symbol with emotional implications, or as a means to avoid undesirable social interaction with bank staff.

Overall, the study highlighted a complex scenario for the ATM market in India. The major factors affecting adoption are related to (a) the way ATMs were perceived by the general population; (b) their usefulness in the Indian society where other sources of emergency money was available and saving time was not a major driver; (c) the multilingual environment and illiteracy; and (d) general issues of emerging market, where advanced technology meets technology illiteracy. Specific cultural dimensions such as power distance, individualism versus collectivism, and long-term versus short-term orientation affect ATM usage, creating a unique environment for adoption. ATMs have been incorporated into a highly hierarchical society, where owning a PC is the exception and borrowing from relatives and neighbours is the norm, and where people are much more tolerant of waiting in queues.

The research also found benefits from use of the ATM, which we had not predicted. The first one challenged the assumption that illiteracy and lack of expertise with technology are major deterrents to technology adoption. We found a few people who fell into these categories, but were regular users of ATMs and could perform complex operations like depositing cash. We also found that ATMs could allow people to escape from the discomfort of the class system. Some people from lower classes preferred using ATMs rather than the teller. These findings show that potentially technology can act as a means to transcend class barriers. In this sense, technology may have an important and unexpected effect on culture whose long-term effect warrants further research. We also did not expect the widespread adoption of English as a preferred interaction medium and had initially under-valued major issues related to the translation of banking and technological terms.

Understanding the relationship between the lower class Indians and technology adoption requires further research. However, this research has unveiled some encouraging results, demonstrating that once people realise the benefits associated with using ATMs, literacy and previous expertise are not intrinsic barriers to adoption. This finding is consistent with a field study in New Delhi, which has demonstrated that slum children can teach themselves and each other to use a computer with no active intervention (Judge, 2000). There is nothing intrinsically wrong with technology for large sections of Indians, the problem is mainly connected to the fact that technology is perceived, and marketed, as an elitist resource, even when it does not have any direct cost to the consumers as in the case of ATMs.

Analysing how first time users approached ATMs we evinced a number of practical usability problems that could be easily solved, but we also understood that decreasing the psychological distance between ATMs and a large proportion of the Indian population would be a much tougher task. The association of ATMs with technology has a negative
effect on adoption, since it triggers the idea of something difficult, alien and expensive. Work has to be devoted to modifying this association and increasing potential users confidence in using the ATM.

Designing for the Indian culture requires providing different services, generating different metaphors, and exploring alternative task solutions. It also requires developing evaluation methods and metrics capable of appropriately capturing relevant dimensions of the interaction. Less emphasis should be given to technology, efficiency and speed of the ATM transaction and more importance given to the entire user experience, including not only ease of use and clarity of communication but also affective involvement. Success in the Indian market requires the evolution of ATMs from a novelty to an everyday facility. This process unfolds over time and with exposure, but an understanding of the culture surrounding the technology may accelerate it.

7. Conclusion

Our project has demonstrated the value of empirical research as a way to clarify the relationship between cultural dimensions and the way people perceive and react to technology, as well as their implication to development of design ideas. Understanding user requirements is instrumental for proposing a robust theory of cultural design. Hofstede’s theory (Hofstede, 2001) was useful as a post-hoc framework to summarise and understand user attitudes, beliefs, and behaviours. It was, however, not sufficient to anticipate which factors affect ATM adoption and usage. Contrary to Marcus (Marcus, 2002, 2003), we believe that Hofstede cultural descriptions may be too high-level to directly inform design of technology and that design would be better informed by carrying out user centred research within the culture.

Our contextual inquiry has also emphasised the fact that multiple sub-cultures exist within India and a common design may not meet the needs of each of them. Personalisation is key to the Indian market. Different sets of users can be presented with different services, marketing and interfaces, depending on their socio-economic class, expertise with the ATM and/or preferences. Illiterate or semiliterate users may require specific, static interfaces, based on simple and repetitive actions. More research is required to investigate whether or not a pictorial design could provide appropriate cues for these users. The real challenge is creating technology for developing markets, to fit their specific needs and requirements that may not match those of the developed words. The current study was restricted to Mumbai, which reflects an urban, industrial, metropolitan culture. More studies are required, to explore attitudes with technology and ATM adoption in smaller cities, towns and villages. We expect more surprises in these areas.

Public technology is important to the development of emerging markets such as India where there is little personal technology. The HCI community has a challenging opportunity to accelerate technology adoption in these markets by undertaking more contextual inquiry within these emerging markets and finding ways to effectively turn contextual data into design ideas.
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