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# The Impact of Design and Placement of ATM Deployments on Perceived Safety in India

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## Abstract

*The recent surge in crimes at Automated Teller Machine (ATM) deployments has resulted in an increase in the fear for safety for those using ATMs in India. These crimes are caused by several factors including, but not limited to, poor design and poor layout. On reviewing existing literature, it is evident that most studies on these crimes, their prevention and regulations, focus primarily on physical and mechanical security measures. Even though the physical surrounding of an ATM is known to strongly affect a user's experience and perception of safety, studies addressing this are few. This paper examines the impact of factors like visibility, lighting, access control, target hardening, surrounding land use and zoning on a user's perception of personal safety. A photo based study of 30 ATM deployments was conducted to evaluate the perceived safety and security of Indian ATM users. The results of the study confirm the importance of lighting. In addition, we demonstrate the impact of visibility, surrounding land use and quality of waiting space on perceived personal security while using an ATM unit.*

Keywords: Fear of crime, Built Environment, ATMs, CPTED, Perceived safety.

## Introduction

Automated Teller Machines (ATMs) offer their customers, a quick and convenient way to withdraw money and make simple transactions. Since they process both money and personally identifiable data, ATMs are considered as high-risk facilities. ATMs were designed to add convenience and be beneficial to users. However, since funds could be accessed virtually any time and any place, safety got traded for convenience (Scott, 2001). Criminals find ATMs as convenience stores of cash and are attracted if environmental

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condition also enhances the opportunity to successfully complete their misconduct (Lewis, 1992). Security strategies implemented currently generally include CCTV surveillance, verification of transactions, biometric cash point dispensers etc. Little importance is being given to how the physical environment can affect an ordinary user's experience. This study, attempts to examine the impact of factors like visibility, lighting, access control, target hardening, surrounding land use and zoning on the fear of crime perceived by a user of the ATM.

## Literature Review

### *ATM Related Crimes and the Environment*

Since an ATM processes financial transactions in the absence of human cashiers, they attract offenders because they seemingly provide direct access to currency, and users' personal information. The different types of ATM attacks include cyber-attacks, ATM replenishment attacks, ram raids, ATM burglaries, robberies and pick-pocketing (Weight, September 2009). In addition to being a threat to personal security, these crimes also pose a threat to both banks and the government. Studies and scientific innovations mostly address issues of violent crimes like ram-raiding, skimming and even cyber-attacks. However, the theft of personal data and pick pocketing in or around ATMs often remain as concerns for the common man. This ever present danger of pick pocketing, robbery, distraction theft and shoulder surfing frequently get overlooked.

The Crime Triangle is a postulate that suggests that crime results when three factors come together in space and time – likely offenders, suitable targets and the absence of capable guardians (Cohen & Felson, 1979). Studies of crimes at ATMs call attention to the importance of location of the deployment since they act as a 'host' to the crime (Scott, 2001). The physical environment therefore can have the effect of reducing, eliminating or even enhancing the opportunities of crime. This focus on environmental factors to provide a comprehensive explanation to crime is also observed in Crime Pattern Theory (Brantingham & Brantingham, 1981). These approaches highlight the role of form and layout of the physical surrounding in reducing the opportunity for crime and can provide a simple solution to most forms of ATM attacks.

### *Importance of Design and Placement of ATMs*

A study of literature reveals that large volumes of mobile, attractive and weakly guarded targets tend to attract criminals and enhance crime. Also, building designs, orientations and street layouts can also form crime generators, crime attractors and crime detractors and can either increase or decrease the opportunities for crime at a location (Kinney et al., 2008; Cozens & May 2009). Further, the presence of 'crime generators' like banks, bars, restaurants, schools and vacant buildings, tend to affect the distribution and pattern of street robberies (Bernasco & Block, 2011). It can thus be inferred that ATM deployments themselves tend to alter the character of public spaces by being thriving points of activity. These highlight the importance of ATM placement.

ATMs were initially placed only inside bank premises. However, today, they are seen at airports, grocery stores, petrol stations, commercial complexes, shopping malls, along sidewalks, temporary venues of entertainment and even disaster sites. Based on their type, variety, installation method and placement, ATM deployments can be classified into the

following categories – Purpose Built Standalone Sites (Kiosk), dedicated ATM rooms within a larger building, adapted ATM rooms within a larger building, ATMs installed on glazed shop façades and freestanding ATMs (Weight, September 2009). These categories can be seen across different regions and different countries, albeit with minor variations. Not surprisingly, the issues of security vary with every ATM deployment since the types and magnitudes of crimes, vary with the physical surrounding. In one study, customers using off-premise ATMs were found to be more vulnerable to robbery (Eloff, 2006). Another study lists out a few environmental features that can contribute to the increase of robberies around ATM deployments. These include telephone kiosks, bench seats, underpasses, inadequate lighting, untrimmed or un-kept landscapes, wide footpaths and solid structures that can act as hiding spots (Doyle, 2004). Loss of control over the physical and social space, poor visibility, entrapped spaces and poor connectivity make a place vulnerable thereby increasing the opportunities for crime. Thus, the spatial structuring of the deployment, visual impression, and design of the ATM kiosk/vestibule can create vulnerable conditions enhancing the opportunities of street crime.

#### *Measures for Crime Prevention and Guidelines for Environmental Design*

Literature identifies several design elements of the environment that serve as measures for reducing crime. These include enhanced lighting, clear lines of sight, defined ownership, careful landscaping, proper signage, land use mix, good maintenance and management. ‘Crime Prevention Through Environmental Design’ (CPTED) is an area of active research where each environmental setting is assessed under six strategies – surveillance, access control, target hardening, territoriality, activity support and maintenance. The first four concern the spatial structuring of locations while the latter two indicate presence and involvement of people. CPTED also deals with exploring the impact of the physical setting and the fear of crime (Moffat, 1983).

Natural surveillance can be defined as the act of increasing guardianship of an asset by maximizing visibility. Orienting a building and its openings towards the public realm can help to increase natural surveillance (Samuels, 2011). Several studies that assessed robberies and burglaries indicate that increased staffing (Bellamy, 1996), security guards (Hannan, 1982) security devices like screens and cameras (Clarke, Field, & McGrath, 1991), guardians, neighbors, passers-by (Sorensen, 2003), electronic surveillance and policing resulted in reduced crime. On the other hand, reduced visibility, high walls and fences and bad lighting at night (Weisel, 2002) had the opposite effect. It was also found that population densities and levels of activity on the streets had a strong correlation with the number of instances of crime in an area. Areas with less population and less activity experienced more crime (Angel, 1968). Strategies involving ‘Access Control’ attempt denying access to offenders by marking spaces as public and private using landscaping or structural elements (Cozens, Saville, & Hillier, 2005). It was also found that the type and quality of access routes strongly influenced the vulnerability of a spot to burglary (Town, Davey, & Wootton, 2003). Areas with unregulated access (Eck, 1997), isolated and unconnected properties (Hillier & Shu, 2000) are also considered as potential hot spots for crime. Strategies involving target-hardening were found to reduce the number of instances of burglary in a region (Allatt, 1984). The physical attributes of the built environment that defined boundaries and ownership e.g. fences, walls, gates, pavement treatments, sign, landscaping etc. were found to be directly related to reduced levels of both crime and fear of crime (Perkins, Meekst, & Taylor, 1992; Perkins, Wandersman, Rich, & Taylor, 1993;

Taylor, Gottfredson, & Brower, 1984). The impact of personal defensible space on street robbery has also been studied in the context of ATMs (Holt, & Spencer, 2005).

#### *ATM Security around the world*

In most countries, security standards and regulations have been in place to protect ATM users for several years. These guidelines and regulations mostly consider only the physical and cyber-security aspects of ATM threats. Many banks have been employing protective measures addressing physical security by using CCTVs, vestibules with card-activated doors, and alarms, (Kennish, 1984; Hudak, 1988).

Many western countries even have design guidelines and regulations for ATMs that consider CPTED. Some of these include careful site selection and placement of ATMs, landscaping, concealment of opportunities for crime around the site, adequate lighting, reflective mirrors, glazed vestibules, public visibility and highly visible approaches to ATMs (ATM Crime Prevention Act, 1987; ATM Security Act, 1996; ATM Safety Act 1997; ATM Consumer Protection Act, 2002; CPTED General Code, 2011; An Act for improving safety at ATMs, 2013). In the United States, one such standard used by the General Services Administration and National Capital Planning Commission for identifying 'security zones' is 'The Urban Design Guidelines for Physical Perimeter Entrance Security' (Atlas, 2008). The New York State Banking Department lists 14 recommendations including monitoring exterior lighting, video surveillance systems and automatic door-locking devices (DiNapoli, October, 2007). In addition, The New York city council elaborately lists out regulations that every ATM should observe in its local law under the categories – building elements, signage, lighting, surveillance cameras and parking areas. Some states even have security standards listed as 'Balancing Tests' to protect ATM operators and banks from civil liability if they comply with those standards. These tests include factors like the surrounding neighborhood, geographic location of the ATMs and budgets of implementing security measures (DeYoung, Fall 1995).

On the other hand, most developing countries have few or no rules and regulations, concerning the physical environment around an ATM, in place that aim at reducing crime. This is evidenced by the dearth of active research being conducted in developing countries on this subject. Also, unlike western countries, where ATMs have had over 30 years to evolve, there has been a sudden burst in the deployment of ATMs in a developing country such as India. This has led to the situation that most facilities are not intentionally designed for ATM deployments but are instead spaces modified in already existing commercial complex or other buildings to accommodate ATM kiosks. This makes it even harder to enforce such regulations as in developed countries.

#### *ATM Crimes in India*

Most ATMs in India are enclosed in kiosks of about 100sq feet, each acting as a virtual branch of the bank (Angelia et al., 2004). The occurrence of ATM crimes in India, as in other developing countries, is not as much as most developed countries. One reason, though not established, may be the relatively high population densities and smaller spatial amenities found in most Indian cities that may add to informal surveillance. Another reason for this may be due of the relatively low penetration ATMs and banking facilities in India. India has about 50 ATMs per 1000 sq. km, 133 per million of the population. Studies show that the current distribution of ATMs seems to be heavily concentrated in

metropolitan cities and urban areas and is about thrice as much as the density of ATMs in rural areas (Bhaskar, December 2013). This clustering of ATMs in urban areas may also be a cause of increased urban crime. There is a steady stream of cases and reports of users being trapped in and attacked from within the ATM kiosk in spite of the presence of CCTV cameras. These incidents support the observation that increasing the penetration of ATMs would only increase the frequency of such crimes (Dastur, 2013).

The statistics concerning crime in India paint a disturbing image with the Ministry of Finance (Government of India) having registered 32,928 cases of frauds pertaining to cyber security, ATMs, debit and credit cards in three years. This also includes frauds related to internet-banking involving 50 nationalized and other banks across country (India Risk Survey 2013). The states Jammu and Kashmir, Rajasthan, Uttar Pradesh, Gujarat and Karnataka have the highest numbers of reported ATM robberies (Chetan, 2013). The current system, however, does not make it easy to collect, isolate and analyze statistics pertaining to crimes specifically at ATM deployments. Even though the data available is scarce, it is clear that ATM robberies are on the rise. Even so, most crimes do not get reported possibly due to the difficulty and delay in getting a resolution by the judiciary system. This has resulted in a transfer of responsibility to the ATM user to stay safe and increased fear of crime in and around ATMs. Thus, it is evident that, security standards to protect ATM users from crimes are the need of the hour.

## Methodology

This study addresses an ATM user's fear of crime in and around ATM deployments. It also explores the factors that a user considers while selecting an ATM to use. The questionnaire survey consisted of two parts.

The first part listed different attributes of the physical environment, obtained from previous studies, which affected crime. Respondents were asked to rate the impact each of these attributes had on their choice of ATM and fear of crime at those ATM units.

Part two of the survey was designed as follows: 30 ATMs deployments, in and around Tiruchirappalli district center, were selected for the study. These ATMs were photographed both during the day and night. In order to perform a thorough analysis of activity levels and lighting around each ATM, the set of photos of each ATM deployment included the following – detailed close up shots, views including the surrounding parking area, waiting spaces, surrounding building boundaries, access routes, surrounding land use and street views giving the context of street activities. These ATMs were then examined for pros and cons under the standard six strategies as suggested by CPTED – visibility, lighting, enclosure, access control, territoriality and surrounding land use. All photographs were then analyzed under each of these strategies. Images that were considered similar were identified and discarded. Thus the final set included photos that demonstrated significant variation for each of the six strategies. Respondents were shown the photographs and asked to rate the images based on their perceived fear of crime at that ATM location.

The data obtained from both parts of the survey were analyzed to get an insight into an ATM user's fear of crime and how the physical environment affects his/her preference of ATMs. The results of this survey can be used to both curb crimes at ATMs and also design deployments that users find inviting. The study also took into consideration demographic factors like gender, age and income in addition to familiarity of the area, time and frequency of use of ATMs.

**Table 1: Variables identified for the study**

	<b>Factors facilitating prevention of crime as listed from different studies</b>	<b>List of building elements and environmental design features (identified at the site) related to ATM design and layout</b>	<b>Variables Identified for the study</b>
1	Sight lines (unobstructed clear line of vision)	<ul style="list-style-type: none"> <li>• Visibility of interiors / exteriors</li> <li>• Obstructions – advertisements, greenery, parking, others</li> </ul>	Visibility
2	Lighting	<ul style="list-style-type: none"> <li>• Street lighting, ATM lighting, Signage lighting</li> <li>• Light direction, shadows and glare</li> </ul>	Lighting
3	Movement predictions	<ul style="list-style-type: none"> <li>• Building orientation</li> <li>• Types of entry and exit</li> <li>• Distance between parking and ATM</li> </ul>	Access Control
4	Ownership of place	<ul style="list-style-type: none"> <li>• Boundary definitions and sharing boundary walls</li> </ul>	Enclosure
5	Landscape	<ul style="list-style-type: none"> <li>• Greenery, gardens</li> <li>• Waiting area</li> <li>• Parking</li> </ul>	Utility Zones
6	Spots of entrapment	<ul style="list-style-type: none"> <li>• Waiting zone and waiting time</li> <li>• Alley and side streets</li> <li>• Blocks, columns, hiding spots, nooks, niches, dark corners, buffer spaces</li> </ul>	
7	Land use mix	<ul style="list-style-type: none"> <li>• Street character – street width, layout</li> <li>• Use: Industrial, commercial, educational, religious</li> <li>• Connectivity and isolation</li> <li>• Frequency distribution of use: Round the clock, uneven or specific hours, uniformly distributed</li> </ul>	Land Use

The survey was conducted in the localities near the ATMs chosen for the study. 96 ATM users were surveyed (43 women and 53 men). About 50% of the respondents were regular users, 30% occasional users and 20% users who used the facility on rare occasions. About 52% of the respondents were below 40 years of age, 28% between 40 to 60 years and 20% of the users above 60 years. The monthly income for nearly 76% of the users was below Rs. 30,000, 16% between Rs. 30,000 and Rs. 70,000 and 8% above Rs. 70,000.

## Results

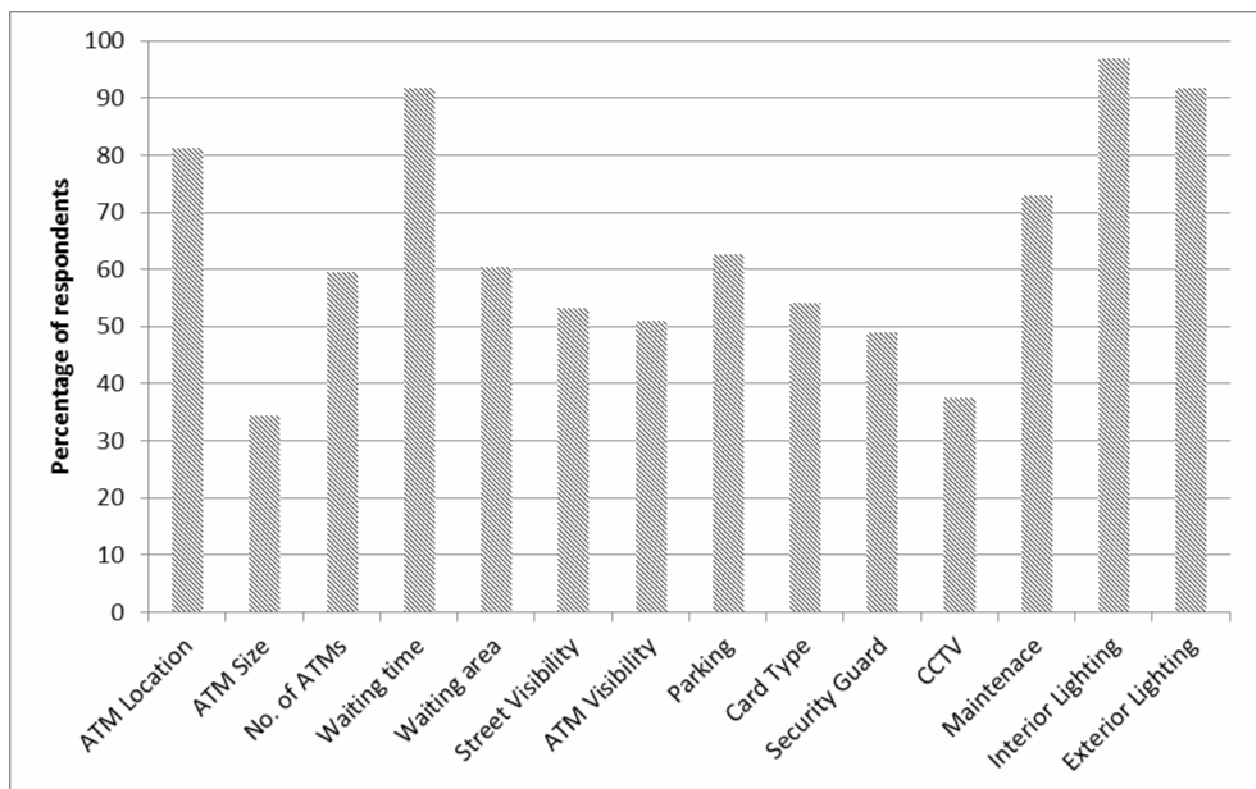
The results of part one of the study indicated that adequate interior lighting (97%), good exterior lighting (92%) are prime concerns for the choice of an ATM deployment. Mixed land use (81%) and good maintenance (73%) were also factors that strongly affected a user's fear of crime. The quality and distance from the parking space was considered a significant factor by 63% of users and the quality of the waiting space was reported as

being important by 60% of the users. Only about 34% of the users felt that the ATM size affected their choice of ATM.

One of the interesting results of this survey was that only 34% of the respondents felt that electronic surveillance was important. This result is noteworthy since a lot of attention and investment during the deployment of the ATM revolves around mechanical surveillance. This is discussed in detail in the following section.

The results of the survey also show that 60% of the users gave importance to proximity of an ATM and 40% favored ATMs that they were already familiar with. 53% of the respondents preferred using ATMs during the day while the other 47% ignored the difference between day and night and visited ATMs as per their need. While this is hardly significant, a strong bias was discovered when gender was taken into account. 79% of the women preferred using ATMs during the day time citing safety and security as the primary reason. On the other hand, only 21% of men preferred to use ATMs during the day, with the rest having no preference. This divide illustrates the importance that should be given to gender differences while conducting such a study.

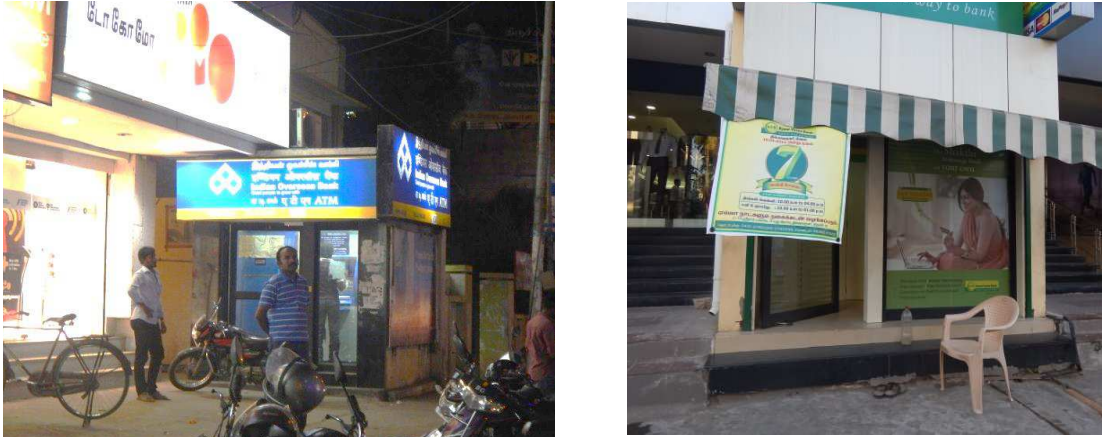
**Chart 1: Factors considered for the choice of ATM deployments**



An analysis based on the access and orientation of the deployments indicated that semi-direct access into the ATM (41%), with ample setback space from the street, was preferred over direct (37%) and indirect access (22%). Also, observations showed a distinct preference for ATMs that were oriented to face the street (60%) to those that didn't face the street (40%). Indirect entries, hidden entries and recessed entries were not preferred. The Pearson Correlation Test revealed a positive correlation ( $r = 0.3$ ,  $n = 96$ ,  $p = 0.03$ )

indicating increases in visibility as correlated with increases in access control. This was confirmed by the fact that 71% of ATM users preferred clear line of sight of the ATM from the street. Ironically, but not unexplainably, it was observed from the photo study (part 2 of the survey) that nearly 70% men and 76% women expressed a conscious dislike for the revealing transparency of ATM façade glass. This oddity is discussed in the following section.

**Figure 1: ATM deployments preferred for access and orientation**



**Figure 2: ATM deployments not preferred due to obstructed lines of sight**





**Figure 3: ATM deployments disliked because of surrounding entrapment zones**



**Figure 4: Well-lit ATM facility (vs.) Poorly-lit facility**



The photo study (part 2 of the survey) also strongly suggests that both exterior and interior lighting were prime measures to increase the possibilities of risk detection and therefore decrease the fear of crime. More than 90% of the respondents indicated that lighting directly influences their fear of crime.

The surrounding land use was also considered as a strong factor affecting a user's perception of crime and fear of crime. Nearly 78% of the respondents preferred a mixed land use. About 90% users, both men and women alike expressed a dislike for indirect entry into the ATM, through another activity space. Women expressed discomfort to enter the ATM deployment in lonely areas or through another activity space, more so if it is for male dominated activities like petrol stations, sports stadiums etc. However, a user's preference for ATM deployments that share their boundary definitions with commercial complexes is evident. 88% women favored ATMs near active and busy streets for improved surveillance. ATM deployments near narrow streets, alley spaces or un-marked activity spaces were not preferred.

The Pearson Correlation Coefficient was also computed to access the interrelationship between the variables. A positive correlation was observed between the surrounding land use and lighting ( $r = 0.51$ ,  $n = 96$ ,  $p = 0.00$ ). This suggests that a user's perception of the quality of surrounding area is strongly affected by how well it is lit. The Pearson Coefficient 'r' between enclosure and lighting was 0.09 and the between enclosure and visibility was 0.1 implying strong independence. This indicates that enclosure, lighting and visibility independently affect a respondents' perception of fear. It could also be deduced that the lighting conditions do not reduce fear of crime in enclosed or inaccessible spaces.

**Figure 5: Preferred ATM deployment in a busy, mixed activity space**



**Figure 6: ATM deployments disliked by female ATM users due of its presence in male-dominated or lonely areas**



It was also observed from the responses to the images shown that waiting times and the quality of waiting spaces were seen highly influential in the choice of ATMs and that they impact perception of crime significantly. The type and quality of waiting spaces had even more of an effect than preferences of access and orientation of the ATM.

Performing the skewness test revealed that the importance given to both visibility and waiting areas were highly skewed (Z-score of 4.04 and 3.19 respectively). This implies that there is a high likelihood that the scores given for these two aspects were skewed and not a Gaussian distribution. This leads us to believe that a significant portion of the users give an unexpectedly high importance to these two factors.

ATM deployments sharing walls with adjacent facilities did not seem to impact the feeling of security, though it altered the quality of the enclosed space and the activity space around the ATM. However, recessed and completely enclosed spaces were considered entrapment zones and were disliked by 90% users.

Deployments with multiple ATM machines were preferred mainly because they implied a reduced waiting time. Distinct dividers, territory markers or flights of stairs that can help structure a queue were found to be preferred. A positive correlation was observed between the preference for quality of waiting areas and the surrounding land use ( $r = 0.50$ ,  $n = 96$ ,  $p = 0.00$ ) indicating that decreasing the fear of crime by improving the quality of the waiting area goes hand-in-hand with improving the quality of the surrounding land use. A positive correlation (with 0.01 significance level) between the preference to lighting and waiting area ( $r = 0.37$ ,  $n = 96$ ,  $p = 0.00$ ) indicates that, in addition to the ATM itself, even the waiting areas need to be well lit in order to reduce the fear of crime. Similarly, the impact of access and orientation on the waiting area was at the 0.1 significance level with a positive correlation ( $r = 0.32$ ,  $n = 96$ ,  $p = 0.01$ ).

## Discussion

### 1. Effect of Waiting Areas

The photo study showed a clear need and concern for the quality of waiting spaces at ATM deployments. This can be explained by considering the Indian context. High population densities, found mostly in urban centers affects security concerns in two different ways – primarily resulting in insufficient numbers of ATM deployments thus increasing waiting time, need for waiting space and additional parking spaces and secondly, increased harassment and pick pocketing near the waiting area making the ATM perimeter more vulnerable. Results of the study also revealed a positive correlation between the effect of quality of waiting area and quality surrounding land use. This implies that both go together in affecting the fear of crime.

### 2. Effect of Electronic Surveillance and Size

The existence of electronic surveillance (CCTVs) was found to have an imperceptible effect on the fear of crime. Scarcity and lack of awareness about electronic surveillance in India can explain the poor association of electronic surveillance as a security measure. Additionally, electronic surveillance can only serve as a mild deterrent to and not prevent crime. This is especially true in the more populous developing countries where law enforcement relying only on video evidence is difficult. This is supported by the fact that many crimes go unpunished even in ATMs that have CCTVs installed. Since the installation CCTVs is a major expense in the deployment and is often the only physical

security measure taken, one could re-evaluate whether or not they serve the intended purpose.

This study also revealed a negligible influence of the size of ATMs on a user's perception of safety and their choice of ATMs. However, observations showed an additional significance given to size of an ATM deployment if the facility contained multiple ATM machines. This suggests that big rooms with many ATMs inside are not preferred due to low personal space and lack of privacy.

### ***3. Effect of Visibility***

As discussed above, users indicated that they strongly preferred ATMs that had clear lines of sight from the outside. However, from the photo study, it was found that users also strongly disliked ATMs that had transparent glass façades. Deployments that had partial visibility of the ATM machine from the outside were most preferred among users. On the other hand, previous studies conducted in other western countries indicate that clear visibility of the inside of the ATM is related to reduction in crime and fear of crime (Guerette & Clarke, 2003; Atlas, 2008). This variation can be attributed to the unique conditions in populous and developing countries, like India, that have a much higher density of shops, buildings and activity spaces. This plays a major role in how visible a person is. Additionally, in places with high density, high visibility could also be a source of perceived threat. In the context of ATMs, a user would prefer conditions with partial visibility – sufficient to expose physical violence, but insufficient to allow shoulder surfing.

### ***4. Effect of Orientation, Access and the Immediate Surroundings***

The results of the photo study found strong preferences for ATM deployments with a direct entry and clear visibility of the ATM machine from the streets. The survey results also revealed a dislike for enclosed spaces, narrow streets, alleys or unmarked activity spaces near ATMs. These results are in line with similar researches that recommend that ATMs having activity on all three adjacent sides, specifically, high-speed traffic on one side, slow-speed traffic on another and relatively permanent observers on the third side offer safe conditions (Atlas, 2008). Other studies have also found that enclosed vestibules attract strangers and can more easily trap a victim (Atlas, 2008).

### ***5. Effect of Lighting***

This study underlined, as by similar studies, the influence of lighting on fear of crime (Ramsay, 1991). Thus, it can be said that that good lighting contributes to the quality of urban life and increases a sense of security which helps to reduce a user's fear of crime. The study also found a positive correlation between the quality of surrounding land use and lighting. These results support the fact that lighting standards and security zone regulations, as adopted by some countries, to curb crime address issues related to fear of crime as well. Hence these standards and regulations can be applied to reduce both crime and fear of crime in Indian cities.

### ***6. Demographic Considerations***

The demographic results of the study showed, in lines with previous literature, the significance of gender and familiarity on fear of crime. These results revealed more concerns and fear of crime among women indicating their gender vulnerability as

highlighted in literature (Scott, 2003; Smith & Stortennsson, 1997; Jackson, 2009; Gilchrist, Bannister, Ditton, & Farrall, 1998). It was also observed that for frequent users, the familiarity of the area reduced concerns of security. People who used ATMs occasionally had a relatively high concern for personal security. This was found to be consistent with others researches along this area that observe that familiarity is a reliable construct of visual preference (Mims, August, 2005; Reis, Maniaci, Caprariello; Eastwick, & Finkel, 2011; Christopher, Tadeppalli, & Subbaiyan, 2013).

### **7. Fear of Crime in Developed vs. Developing Countries**

This study confirms that the general concepts of CPTED apply to a developing country, such as India, as well as they applies to developed nations, where they were formulated. However, one needs to keep in mind the differences in the environmental conditions, perception of spaces and threats while interpreting the data obtained from such a survey. As far as ATMs go, the key differences where the fear of crime in India was different from western countries were: a) partial visibility was preferred over high visibility, b) the importance of waiting areas and c) relatively low impact of CCTVs. The inferences from this study could be used as guidelines while designing ATM deployments in developing countries. Further, it could also lead to the formation of enforced rules and regulations for such facilities in Indian and other developing countries.

### **Conclusion**

In this study, we analyzed the impact that the physical environment, in and around ATM deployments, had on users' safety and security. One of the unique results of this study was that, in addition to the established factors, the quality of waiting spaces for an ATM deployment was a key factor affecting a user's fear of crime. It was also deduced that the general concepts used by CPTED, security and oversight laws, balancing tests, NCPC regulations etc., that many western countries use to prevent crime, can be applied to reducing the fear of crime in developing nations as well. Specific differences in factors affecting security at ATMs in developing and developed countries were discussed. Future research could evaluate the impact of existing standards and regulations for safety on the fear of crime which would give us more insight into the subject and help us construct a complete set of regulations to prevent both crime and fear of crime.

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