A COMPUTER-BASED SECURITY FRAMEWORK FOR CRIME PREVENTION IN NIGERIA

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ABSTRACT

In recent times, crime rate in Nigeria has risen to the level in which there is a public outcry to the government for urgent solution. Government has adopted various security policies to secure the lives and properties of its citizens, but none of these policies has actually yielded a positive result. Human abduction, armed robbery, terrorism, bomb attacks and lot more have been the order of the day in the country. In the light of this, the government has come up with the introduction of computer-based closed circuit television (CCTV) cameras in public places to monitor and record images of what is taking place in specific locations. Many developed countries have used CCTV to reduce the crime rate in their respective countries. Because CCTV is relatively new in Nigeria, it is still not clear how effective it is in deterring or reducing crime. Consequently, community perceptions were sought to know the effectiveness and acceptability of the tool in public places. However, being one of the ingredients of information technology for national security, respondents actually gave good indicators in supporting the usage of CCTV provided it is implemented with proper mechanism and run by the right organization. Few important factors had been recommended as pillars to secure the framework such as operational requirements, decision guidelines, performance standard, evidence requirements and importance of CCTV operators.

Keywords: CCTV, Security, Crime prevention, Nigeria

1.0 INTRODUCTION

National security threat has been a major issue for the government of Nigeria in recent years. Recently, Nigeria has been characterized with different turmoil ranging from human abduction, political mayhem, terrorism and bomb attacks. Governments have tried several methods in order to curb these menaces but all of them have been proved abortive. Due to this, the government has resolved to adopt the use of computer based CCTV cameras in public places to monitor and record events that takes place in a particular location. CCTV cameras are used to monitor and record images of what takes place in specific locations in real time. The images collected are sent to a monitor and recorded on video tape or as digital information. The cameras can be fixed or set to scan an area or they can be operated by controllers. Monitors can be watched by controllers or left unmonitored. The recorded information can be stored and/or reviewed by those who have accessed to the

recordings at their convenience. As the number of systems is believed to increase in the future, so also is their technological sophistication. But little is known about public opinion towards CCTV and acceptability of the tool in public places. Evidence shows that when cameras are first installed there is likely to be an initial deterrent effect. This though will be short lived, unless the public can see that the scheme is being well managed, the cameras are recording, with good quality images, and any incident caught on camera will be followed up by the police or other appropriate authority. As an example, the Federal Bureau of Investigation (FBI), the investigative arm of the US Department of Justice, has been roped in to assist the police in enhancing the blurred image of the suspect recorded on CCTV carrying the sports bag in which Nurin's body was found. Unfortunately, after FBI assistance, the image still cannot help the investigation due to the quality of CCTV system that had been fixed at the crime scene. In other words, we should have the best CCTV system which would be operated by the best organisation. Despite our action to spend money for CCTV installation, we still have to find the solution for a secure framework in implementing CCTV system. Definitely, besides considering the cost, we also need to look into the best operational requirements and mechanism to run the system. By referring to best example for Nurins's case, to get the most out of CCTV in terms of detection, we will need to ensure the following factors: The cameras are active and the recording medium is recording, whether on tape or hard disk; the images meet the standards required by the objectives, if we want the images to be used as evidence in legal proceedings then they have to be of acceptable quality; the cameras have to be focused on the incident concerned. So if we are protecting a specific entrance or boundary, the camera can be static and not monitored, to record someone in its field of vision. The problem though is that an incident cannot be detected or recorded if it occurs out of the camera range. If you are covering an area with a lot of movement of people and you want to be to identify the incident and the operator, then ensure they capture the relevant details on camera. Cohen (1979) suggested that for a crime to be committed there must be a motivated offender, a suitable target and the absence of a capable guardian. Any act that prevents the convergence of these elements will reduce the likelihood of a crime taking place. CCTV, as a capable guardian, may help to reduce crime. Community perception were sought in order to determine the acceptability of these technology and secure framework such as operational requirements, decision guidelines, performance standard, evidence requirements and importance of CCTV operators were proposed.

2.0 LITERATURE SURVEY

2.1 History of CCTV

Closed circuit television (CCTV) plays a significant role in protecting the public and assisting the police in the investigation of crime. The UK is one of the most watched countries in the world (McCahill and Norris, 2003; Phillips, 1999). It is estimated that there are five million CCTV cameras in use today, and this number is likely to rise in the future (Gill, 2006). CCTV is a surveillance technique that aims to prevent crime by increasing the perceived risks of potential offenders in engaging in criminal acts (Clarke, 1997). CCTV was first utilized by the United States Military in the 1940s. Closed circuit cameras were set up during the testing of the V2 missile in order to safely monitor the tests. By using CCTV, officials were able to monitor the testing at close range without danger, watching out for defects and other problems that might have otherwise gone undetected. In the 1960s, officials in the UK began installing CCTV systems in public places to monitor crowds during rallies and appearances of public figures. Installation of cameras became more popular, both in public spaces and retail stores, as the technology developed. Today in Britain,

CCTV cameras monitor roads, sidewalks and squares in city centers, public rail stations and buses, as well as in retail shops and other businesses. In 1996, government spending on CCTV technology accounted for three quarters of the crime prevention budget in the UK. In the United States, the first CCTV system set up in a public building was in 1969 in the New York City Municipal building. This practice quickly spread to other cities and was soon widely implemented. Unlike the UK, CCTV in public spaces in the United States is rarely used. However, in the 1970s and 80s, CCTV use became more common in establishments prone to security threats, like banks, convenience stores, and gas stations. Security cameras were installed in the World Trade Center as a preventative after the terrorist attack in 1993. By the mid-90s, ATMs across the country were commonly equipped with CCTV cameras, and many retail stores used CCTV to prevent theft.

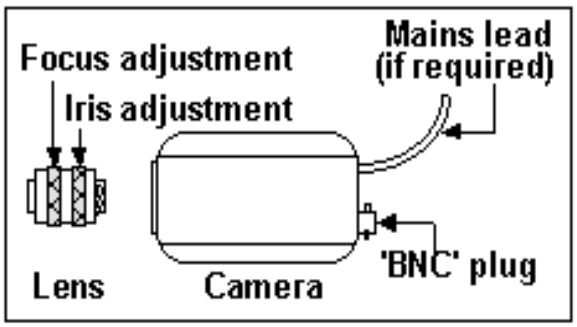

Figure 1: Camera and Lens

2.2 Crime Prevention Concept

Crime prevention is a term descry-bing techniques used for reducing victimization as well as deterring crime and criminals. It is applied specifically to efforts made by governments to reduce crime, enforce the law, and maintain criminal justice. Obviously, crime prevention is including any initiative or policy which reduces or eliminates the aggregate level of victimization or the risk of individual criminal participation. It includes govern-ment and community based programmes to reduce the incidents of risk factors correlated with criminal participation, the rate of victimization as well as efforts to reduce perceptions/fear of crime.

2.3 Overview of CCTV System

As the name implies, it is a system in which the circuit is closed and all the elements are directly connected. This is unlike broadcast television where any receiver that is correctly tuned can pick up the signal from the airwaves. Directly connected in this context includes systems linked by microwave, infrared beams, etc. This section introduces the main components that can go to make up CCTV systems of varying complexity.

2.3.1 The camera

The starting point for any CCTV system must be the camera. The camera creates the picture that will be transmitted to the control position. Apart from special designs CCTV cameras are not fitted with a lens. The lens must be provided separately and screwed onto the front of the camera. There is a standard screw thread for CCTV cameras, although there are different types of lens mounts.

Not all lenses have focus and iris adjustment. Most have iris adjustment. Some very wide angle lenses do not have a focus ring. The 'BNC' plug is for connecting the coaxial video cable. Line powered cameras do not have the mains cable. Power is provided via the coaxial cable.

2.4 CCTV System and Security Concept

Security is “the situation that exists as a result of the establishment of measures for the protection of personnel, information and property against hostile persons, influences and actions (Akin, 2008). It embraces all measures designed to protect and safeguard the citizenry and the resources of individuals, groups and the nation against international sabotage or external aggression”. Security can also be defined as any measure taken with a view to protecting anything of interest to an individual, organization or government, lives, money

and materials are usually the essential things the security staff is required to protect. The threats to Nigeria security according to Adalemo (2000), is epitomized by the virtually unstoppable rural urban drift (in spite of the deteriorating conditions in urban centres of the country) the fierce competition for the control of State power (especially at the federal level), the manipulation of ethnic and religious identities and sensibilities, the clamour for resources control and convocation of a sovereign National Conference (SNC) could be seen as indicators of the failure of the State to generate inclusive growth and development. The list of criminal acts is endless: assassinations, kidnapping, arson, organized armed robbery, vandalization, ritual acts, financial crimes, fraudulent acts, impersonation, economic sabotage, political brigandage in the general society, prostitution and women trafficking, drug abuse, cultism, examination malpractices, bullying, raping and assault amongst youths and students.

CCTV is a valuable management and security tool. The installation of a CCTV system as part of a series of security recommendations generally intended to prevent or detect crime. CCTV can be very effective in maintaining security. Video evidence can help with security enquiries or investigations and assist in securing criminal convictions. The visual recording of incidents, for evidential or investigative purposes, has many benefits and with a competitive customer driven market is no longer cost prohibitive. CCTV systems will vary in size and complexity depending on their purpose and the defined security operational requirements. However, the basic purpose of any system will be to observe a scene and the activities that occur within it. The observation may be:

(i) Covert - the camera is concealed.
(ii) Discreet - the presence of the camera will be known to some people, but its appearance will not automatically suggest its purpose.
(iii) Overt - the appearance of the camera will be designed to clearly indicate its function and maximize the deterrent effect.

For crime prevention overt CCTV systems are usually more suitable whereas discreet or covert systems are more appropriate for crime detection and prosecution.

2.4.1 The mechanism of crime reduction

The mechanisms under which CCTV aims to reduce crime are based upon the following assumptions:

(i) Deterrence. The potential offender becomes aware of the presence of CCTV, assesses the risks of offending in this location to outweigh the benefits and chooses either not to offend or to offend elsewhere.
(ii) Efficient Deployment. CCTV cameras allow those monitoring the scene to determine whether police assistance is required. This ensures that police resources are called upon only when necessary.
(iii) Self Discipline.
    - By Potential Victims. They are reminded of the 'risk' of crime, therefore altering their behaviour accordingly.
    - By Potential Offenders. The threat of potential surveillance (whether the cameras are actually being monitored may be irrelevant) acts to produce a self discipline in which individuals police their own behaviour. In the jail, prison cells were arranged around a central watchtower from which a supervisor could constantly survey them. Prisoners could never be sure whether they were being watched, so began to police their own behaviour: 'Foucault (1991) laid down the principle that power should be visible and unverifiable. Visible: the inmate will constantly have before his eyes the tall outline of the central tower from which he

is spied upon. Unverifiable: the inmate must never know whether he is being looked at at any moment, but he must be sure that he may always be so'. Similarly, the CCTV camera may produce self-discipline through fear of surveillance, whether real or imagined.

(iv) Presence of a Capable Guardian. The 'Routine Activity Theory' by Cohen (1979) suggests that for a crime to be committed there must be a motivated offender, a suitable target and the absence of a capable guardian. Any act that prevents the convergence of these elements will reduce the likelihood of a crime taking place. CCTV, as a capable guardian, may help to reduce crime.

(v) Detection. CCTV cameras capture images of offences taking place. In some cases this may lead to punishment and the removal of the offenders' ability to offend (either due to incarceration, or increased monitoring and supervision). The latter mechanism is by far the most publicized, with few bank robbery cases, in which images of the offenders on CCTV aided their detection and subsequent arrest.

However, the mechanisms by which CCTV may prevent crime are numerous. These have been articulated by Armitage, (2002), which has been described as follows:

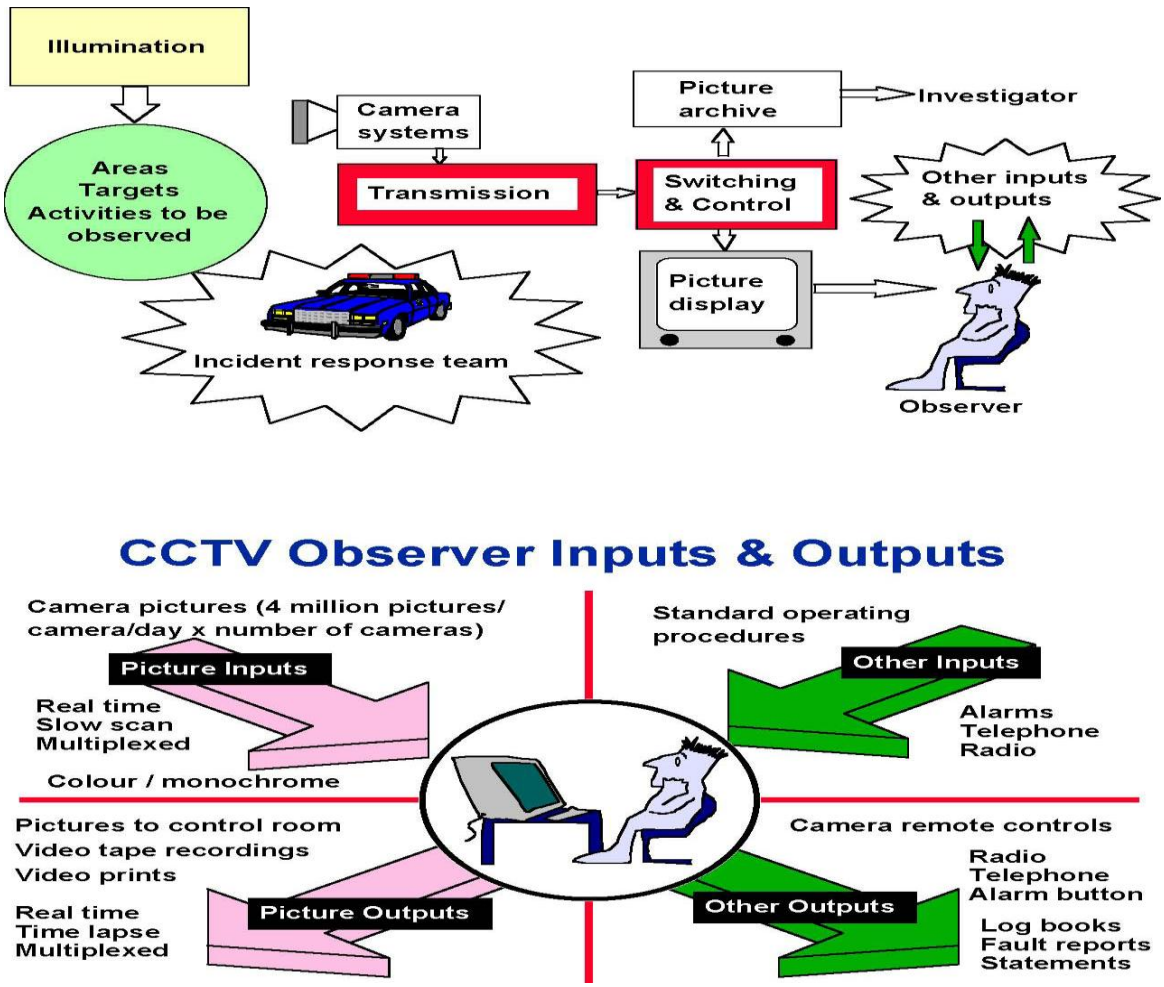

Figure 2: Typical CCTV System Components and Observer Inputs and Outputs

Source: Hamidi B., (2008)

(i) Caught in the act – perpetrators will be detected, and possibly removed or deterred.
(ii) You have been framed – CCTV deters potential offenders who perceive an elevated risk of apprehension.
(iii) Nosy parker – CCTV may lead more people to feel able to frequent the surveilled places. This will increase the extent of natural surveillance by newcomers, which may deter potential offenders.
(iv) Effective deployment – CCTV directs security personnel to ambiguous situations, which may head off their translation into crime.
(v) Publicity – CCTV could symbolize efforts to take crime seriously, and the perception of those efforts may both energize law-abiding citizens and/or deter crime.
(vi) Time for crime – CCTV may be perceived as reducing the time available to commit crime, preventing those crimes that require extended time and effort.
(vii) Memory jogging – the presence of CCTV may induce people to take elementary security precautions, such as locking their car, by jogging their memory.
(viii) Anticipated shaming – the presence of CCTV may induce people to take elementary security precautions, for fear that they will be shamed by being shown on CCTV.
(ix) Appeal to the cautious – cautious people migrate to the areas with CCTV to shop, leave their cars, and so on. Their caution and security-mindedness reduce the risk.
(x) Reporting changes – people report (and/or police record) fewer of the crimes that occur, either because they wish to show the desirable effects of CCTV or out of a belief that "the Council is doing its best" and nothing should be done to discourage it.

2.5 How CCTV Aims to Prevent Crime?

A CCTV system is not a physical barrier. It does not limit access to certain areas, make an object harder to steal or a person more difficult to assault and rob. This does not mean it is not an example of situational crime prevention. It is highly situational, and as will be shown, does have some crime prevention capacity in the right situations. Although CCTV has many functions, the primary preventative utility is to trigger a perceptual mechanism in a potential offender. It seeks to change offender perception so the offender believes if he commits a crime, he will be caught. In other words, CCTV aims to increase the perceived risk of capture, a factor which, assuming the offender is behaving in a rational (or limited rational) manner, will de-motivate the potential offender. For this crime prevention process to succeed, two elements must exist:

(i) The offender must be aware of the cameras' presence.
(ii) The offender must believe the cameras present enough risk of capture to negate the rewards of the intended crime.

Consider the first element. If, for example, a CCTV system is initiated to stem a perceived increase in disorder crime in a town centre, the crime prevention mechanism requires that potential offenders know they are being watched. Evidence suggests that even though implementers install a system, have a publicity campaign, and place signage, there is no guarantee the population will be aware of the cameras.

In Glasgow, Scotland, 15 months after 32 cameras were installed in the city centre, only 41 percent of those interviewed were aware of the cameras. These findings are similar to other research that found only one-third of respondents were aware they were within the vision of a public-street CCTV system.

Not only are there limitations with the public's perception of the location of cameras, the second element (the presence of cameras affecting offenders' perception

of risk) are not guaranteed. In theory, CCTV should provide the capable guardianship necessary to prevent a crime, but this concept requires that offenders demonstrate rationality in their behaviour. There is certainly the suggestion, and some qualitative evidence, those potential offenders who are under the influence of alcohol or drugs may not care or remember that they may be under surveillance. This may be a factor in the reason CCTV appears to be more effective in combating property crime than disorder and violent offences.

There is a second mechanism whereby CCTV has the potential to reduce crime. The cameras may be able to assist in the detection and arrest of offenders. This crime prevention mechanism requires that police can respond in a timely manner to any significant incidents identified by camera operators, and that the local criminal justice system can pursue the offenders' conviction. This mechanism will work if incarcerated offenders are prevented from committing further crimes within the CCTV area (or other local area). Although there may be some initial crime reduction due to the installation and publicity of a new system, offenders may soon learn what types of incidents elicit a police response and the speed of that response. The availability of local resources is therefore a factor in the success of this mechanism.

The desire to catch an offender in the act is often the rationale behind the placement of hidden cameras. Undoubtedly CCTV evidence is convincing, though CCTV's ability to reduce overall crime levels through detection (rather than prevention) is less convincing and arguably a less effective way of impacting crime. For this mechanism to be effective, the implementer must believe arrests are the best way to solve a crime problem. There is some evidence that increasing arrests can have a short-term benefit, but the benefit fades in the long term without a more preventative policy.

An important consideration in the effectiveness of a surveillance technology is the type of crime to be tackled, because this impacts the criminals' ability to adapt. Although a CCTV system may reduce the likelihood of burglary at a commercial location within the range of the camera, there is some evidence that drug markets can continue operation in the presence of CCTV by changing their operating practices. For example, at one location some offenders met and discussed business in the cameras' presence, but concluded the transaction at another site. In other CCTV areas, however, drug crime that could not successfully relocate or adapt to the cameras was eradicated.

Fake cameras have been employed in some instances. It was learned that crime was reduced on public buses after the installation of both active and dummy cameras onboard a number of buses (indeed crime reduced on more buses than the ones fitted with any cameras, a concept known as a diffusion of benefits). It is therefore possible that fake cameras could achieve the same preventative aim as active systems. However, if users of the space under surveillance are led to believe - through signs, for example - that they are being watched 24 hours a day and an incident occurs, the misrepresentation of a form of guardianship may have liability implications.

A third, more general mechanism by which CCTV may reduce crime is through an increase in collective efficacy. Welsh and Farrington (2002), argue that if residents see CCTV cameras being installed in their neighbourhood, this will signal to them a degree of investment in an effort to improve their local area. They argue that this might lead to greater civic pride and optimism, and, as a result, lead to an increased level of informal social control among the local people. A counter to this argument is that overt cameras may instead lead to a neighbourhood being labelled as high-crime, accelerating the process of social disorganization.

2.6 Aid to Police Investigations

Regardless of the potential for a CCTV system to have a role in crime prevention, it can still make a contribution in a detection role. There are numerous examples of CCTV tapes aiding in an offender's conviction. Camera footage can also help identify potential witnesses who might not otherwise come forward to police. CCTV camera evidence can be compelling, though issues of image quality are a factor if CCTV images are used for identification purposes. If the cameras record an incident, and police respond rapidly and make an arrest within view of the camera (and the offender does not leave the sight of the camera), the recording of the incident can help investigators gain a conviction, usually through a guilty plea. The potential to assist in police investigations may also drive offenders away from committing offences that take time, as they run a greater risk of capture.

2.6.1 Provision of medical assistance

As a community safety feature, CCTV camera operators can contact medical services if they see people in the street suffering from illness or injury as a result of criminal activity (such as robberies and assaults) or non-crime medical emergencies. The ability to summon assistance is a public safety benefit of CCTV.

2.6.2 Information gathering

Cameras can also be used to gather intelligence and to monitor the behaviour of known offenders in public places (such as shoplifters in public retail areas). Camera operators often come to know the faces of local offenders, and the cameras become a way to monitor their movements in a less intrusive manner than deploying plainclothes police officers. For example, officers in one city were able to gather intelligence on the behaviour of individuals selling stolen goods. This intelligence was gathered remotely by CCTV cameras and enabled police to interdict in an organized and coordinated manner. Although intelligence gathering is a potential benefit of CCTV, the use of intelligence gathered from CCTV to control public order through surveillance is perceived by some to be a threat to civil liberties.

3.0 METHODOLOGY

This section describes the methodology used for this paper and also proposed secure frameworks for CCTV usage.

3.1 Scope of the Questionnaire

In order to measure individuals' awareness of CCTV, the set of questionnaire which has only covered the general aspect has been distributed to 50 respondents in a certain community. This question has been fixed to value their perception of its purposes and capabilities, and any public concern in respect of CCTV implementtation.

From the first question, which is asking the existence of CCTV cameras in various places, all the respondents noticed the presence of this system and they clearly indicates the places. It shows that CCTV system is not a new thing in Nigeria. Then, 75 percent of respondents agreed the purposes of these cameras are for monitoring and some security reasons like the following actions:

(i) To catch people who commit a crime.
(ii) To scare off somebody who might commit a crime.
(iii) To make people feel safe.

While the remaining 25 percent agreed the purposes of the cameras are to:

(i) Check up on general public
(ii) Stop trouble breaking out
(iii) Spy on people.

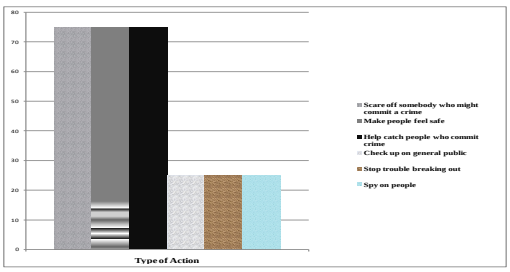

Figure 4: Public opinion on camera purposes

The effectiveness of the CCTV cameras received mix reactions based on its purposes where 60 percent of them are not convinced that cameras can catch criminals efficiently.

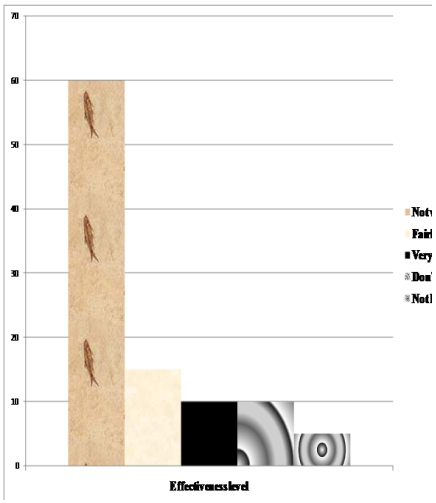

Figure 5: Effectiveness of the cameras in catching criminals

But then 70 percent of respondents agreed that these cameras can be used for scaring off criminals and about half of the respondents think the cameras cannot make people feel safer.

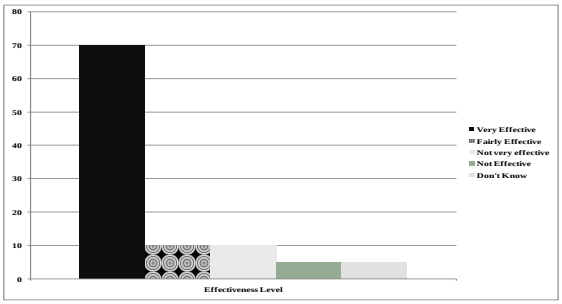

Figure 6: Effectiveness of the cameras in scaring off criminals

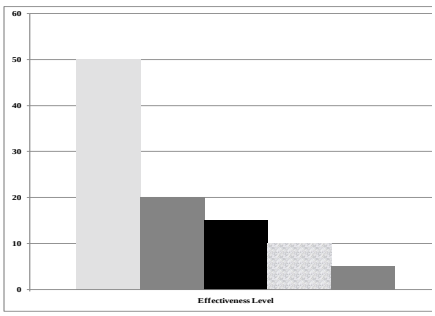

Figure 7: Effectiveness of the cameras in making people feel safe

Most respondents agreed that the police should be allowed to make decision about putting cameras in the city and followed by the local council and private security firms. Respondents also made a guess on cameras usage where 60 percent had chosen to have hidden cameras so that people do not know they are being watched and half of them chose the following guesses:

(i) Can pick up conservation (as well as a picture).
(ii) Are being watched by someone as the camera transmits the pictures.
(iii) Can see in the dark.
(iv) Can pick up close-ups of people's faces.

In the concluding question, respondents were asked to respond whether to agree or disagree with the statement that the other people have said about the CCTV cameras. Most of the respondents agreed with the following statement:

(i) People who obey the law have nothing to fear from these cameras.
(ii) These cameras could easily be abused and used by the wrong people.
(iii) People have right to know whenever they are being watched by a camera.
(iv) The more of these cameras we have the better system.
(v) The people who are in control of these systems can certainly be trusted to use them only for the public good.

40 percent of respondents disagree with the following statement:

(i) It would be OK to use hidden cameras.
(ii) People should always be told by a large notice when such camera is being used.
(iii) These cameras invade people's privacy.
(iv) In the future, cameras will be used by the government to control people.

However, out of 11 statements, none of the respondents agree with the statement saying that cameras are really 'spy cameras' and should be banned.

3.2 Proposed Secure Framework

This section discusses the recommenddations of proposed secure framework for CCTV system implementation as crime prevention tool. The section first explains briefly about the operational requirements as critical factor in producing the framework. Then it focuses on decision guidelines, performance standards and other factors involved in completing the suggested framework. The suggested framework is first represented with the chart in figure 3.

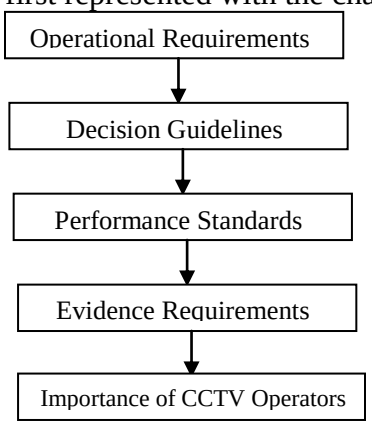

Figure 3: Framework for CCTV system

3.2.1 Operational requirements

The decision to invest in a CCTV system should be made only when it has been decided the purpose for which it is intended. Clearly defined "Operational Requirements" should be agreed between the installer and the customer before investing in any such equipment. The choice of cameras, monitors, recording equipment and storage medium will be governed by the defined "Operational Requirements". Operational Requirements determine which areas or subjects necessitate monitoring, detection, recognition or identification standard of viewing and recording. Basically, it is a statement of needs based on a thorough and systematic assessment of the problems to be solved and the hope for solutions. A clear understanding of the Operational Requirement is fundamental to the design, test and operation of an effective economic system.

A reputable CCTV company will clearly understand the distinction of each chosen function. All will impact on the choice of any given system. The ability to capture images in all weather and lighting conditions may also necessitate additional expenditure on support equipment.

3.2.2 Decision guidelines

CCTV is a complex matter and great care should be taken in the selection of any supplier and installer. It is prudent to select a recognized reputable company. Cost factors should not be the primary consideration when deciding on the latter.

The following guidelines should be observed in order to maximize the benefits of the system:

(i) Control of the system should be coordinated from a central point.
(ii) Access to all equipment should be strictly controlled by nominated personnel.
(iii) All recording facilities and recorded data should be held in locked purposely constructed security cabinets and out of public view.
(iv) System integrity is vital. A register of the recorded data, whether on tape or disc, and persons handling them should be kept. Failure to ensure the integrity of the recorded evidence can lead to it being inadmissible in any subsequent legal proceedings.

3.2.3 Performance standards for CCTV system

Obtaining image detail is obtained at the cost of a camera covering and viewing a smaller area. Taken in terms of recording the image of a person on screen, the performance standards are as follows:

(i) To monitor and control - the captured image should occupy not less than 5% of the screen size.
(ii) For Detection Standard - the captured image should occupy not less than 10% of the screen size.
(iii) For Recognition Standard - the captured image should occupy not less than 50% of the screen size.

(iv) For Identification Standard - the captured image should occupy not less than 120% of the screen size.

3.2.4 Using video recordings as evidence

CCTV is also good in detecting and prosecuting anyone carrying out crime. It can be effectively used in detecting crime if and only if the monitoring room is also at the same place. It is because, if anything wrong happens in the area under CCTV supervision, the personnel can immediately alert the person in charge of that area, so that crime can be stopped directly. In the case of prosecution, the recorded video of the CCTV can be used as evidence in court. Whoever is being caught with CCTV while committing a crime, has no other way out. Of course the video must be tested for the originality before hand.

3.2.5 Importance of CCTV operators

CCTV system operators are the link between the system technology and its effective use. An operator's performance will largely determine the level of service provided by the system. CCTV systems are fast becoming integral players in town centre management, for crime prevention, incident scene management and in investigation teams. Appropriate selection and recruitment practices teamed with targeted training, are needed to ensure that operators are proficient at their job: maximising system effectiveness and limiting its misuse. Targeted training will not only improve the quality of service provided, but will also increase staff satisfaction and may help to reduce absenteeism and staff turnover.

4.0 CONCLUDING REMARKS

Result from this research paper work shows that the use of CCTV in the security environment can be very advantageous. Once the end user has identified realistic performance goals for a system as part of an overall crime prevention/reduction strategy, and then its effectiveness can be recognized, measured and valued. It is paramount that the intended role and operational requirements of a CCTV system are predetermined and agreed. As a management tool, it can be used for incident reduction or post-incident analysis, to act as a deterrent or to provide valuable support to security. It can be used as a valuable support for a crime investigation. Further research can work on the technical configuration of the system and legislation aspect in context to have binding law to complete police investigation. In addition to that, enhance-ment work can be done to work on the risk management and mitigation plan to improve the efficiency of CCTV system and the organizations involved.

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