

## **The Impact of Mathematics Skills in Solving Crime and Security Problem**

**By**

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### **ABSTRACT**

The paper highlights the utilization of mathematics skills in solving crime and security problems. The role that mathematics plays in various forms of security problems are also examined. One of the recommendations among others is that government should encourage the use of cryptography and CCTV by military officers, banks, homes in order to reduce crime and security problem

### **INTRODUCTION**

Crime is an act which involves the criminal law of the place and is punishment by a political authority, usually the state (Ugwulebo, 2008)

A crime is an offence against a specific individual for an act, or omission to be a crime not only must there be criminal intent, but the behavior must be in violation of the criminal law. Crime is a thorn in the flesh and more felt in the developing nations than developed countries. Mathematics is the pivot of all civilizations and technological development (Eguavon 2002). This is why nations spend their substantial part of budget on security.

Security is defined as freedom from fear, freedom from wants (Nwangwu, 2010). The virtue and value of debate and dialogue for security rest on the understanding that a society ought to know how to talk and how to listen does not need to resort to violence.

Farrar (2002) emphasized the need for critical skills in Mathematics, Engineering, Information and Communication Technology to enable the Federal Bureau of Investigation (FBI) to exploit digital evidence and the technologies that collect, convey or process digital evidence and the technologies that collect, convey or process digital information about the nations security.

Schatz (2004) pointed that the United States National Security Agency hires approximately fifty (50) highly qualified mathematics per year to enhance its operational work. Ugbehor (2009) described Mathematics as the Language of Science and Technology. Ibidapo-obe (2011) also stated that Mathematics knowledge is fundamental in addressing the critical issue of economic transformation and globalization. Otunu-ogbisi and Ukpebor (2009) described Mathematics as an effective tool for solving crime and security problem. The paper examines the various mathematical skills and the effects of it in solving crime and security problems. It is on the basis of this that the paper examines the various Mathematics skills and the effect on the National Security System.

### **The Importance of Mathematics Skills**

Trombley and Weiss (1993) defined basic mathematics skills as those skills that the majority of high school graduates would be able to perform successfully after exposure to the typical mathematics curriculum. They went further to remark that mathematical skills is a multi-faceted

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construct that in general, reflects the ability to do quantitative thinking, or more specifically, be able to discover, manipulate and evaluate relationships. According to the National Council of Teachers of Mathematics NCTM (2011), basic skills of mathematics must not be limited to routine computation at the expense of understanding, application and problem solving. According to Odili (1986), Harvey (2008) and National Council of Teacher of Mathematics (2011), ten basic areas were developed by National Council of Mathematics Supervisors (NCMS).

### **Mathematical Skills and its Effects on National Security**

The effects of mathematical skills in a nation's security can be highlighted in some characteristics areas. These are:

#### **Cryptography (Data Security)**

Cryptography is the practice of hiding information, converting some secret information to a non-readable text. It enables one to store sensitive information or transmit it across insecure networks (like the internet) so that it cannot be read by anyone except the right person(s).

This makes use of number theory (Modular Arithmetic) and concept of prime number. It is the science of using mathematics to encrypt and decrypt data. Applications of cryptography include military information and intelligence, electronic commerce, bank and payments and electronic building access. It is one of the cornerstones of internet security (Zakariyya&Barwa, 2013).

#### **Wavelet Transformation (Signals Intelligence)**

This is a new technique which is very important in all types of signal transmission and it is based on transmission of a series of numbers. Wavelet analysis is an exciting new method which applies principles of mathematics and physics in solving difficult civil and security problems.

Some applications of wavelets are powerful statistical tool which can be used for a wide range of applications namely:

- Signal processing
- Data compression
- Fingerprint (which is more surprising), for detecting the properties of quick variation of values
- In internet traffic description for designing the services size
- Industrial supervision of gear-wheel
- Computer graphics and multi-fractal analysis
- Wave propagation
- Image processing
- Pattern recognition
- Detection of aircraft and submarines.

Wavelet process complex information at different positions and scales and reconstructs them with high precision (Zakariyya&Barva, 2013).

### **Mathematics: An Effective Tools For Solving Crime and Security Problems**

Closed Circuit Television (CCTV) is a technological system of video surveillance by cameras, which can be set up and used by public authorities in public places for crime prevention or crime prosecution. The word surveillance, as a concept and management tool, is described by several sociologist and criminologist like Clive Norris and Gary Armstrong in Carli (2008), as the elementary building block of all human societies, a form of power, and representative of the

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development of technology. Surveillance can be both public and private. CCTV is a multifunctional technology used to manage risk in cases of traffic jams, fire, accidents and crime (Hempel&Topfer, 2002).

Images are sent to a central television monitor or recorded in a control room (European commission for democracy through law (Venice Commission) (2007). Video surveillance can be 'overt' or 'covert' and used to discourage potential offenders, for the police to gather images to build files or for evidence at court (Ieman-langlois, 2003). CCTV systems have expanded to facial recognition system, infrared devices, Computerized databases to track people, recording of sounds and voice (microphones), automated license plate identification, cellular alarm communication, roving video surveillance, unmanned aerial vehicles and wireless high-speed computer networks that transfer rates and improved quality.

Currently, there is available software that translates facial features into simple Mathematics formulas that can be checked against data banks at a faster pace (Ieman-langlois, 2003). In 2002, the United States parks service installed face recognition software on the computer video surveillance cameras at the statues of liberty and Ellis Island. At the same time, the Australia's Sydney international airport installed smart gate, which is an automated border crossing system for scanning crew members' faces that confirms images with passports. Also in 2003, the royal palm middle school in phoenix, Arizona installed face recognition video surveillance as a pilot program for tracking missing children and registering sex offenders.

Sound location technology is another device of CCTV which refers to the integration of sound location to the video systems by linking gunshots to facial impressive amounts of investment by the united state military in security surveillance technology (contributed to improvements in motion analysis, radar detection and light amplification) as well as the expansion of global private security firms. Automatic number plate recognition (ANPR) of license plate reader/license plate recognition (LPR) is a mass surveillance method of CCTV that uses optical character recognition on images to read the vehicle license plates. Since 2006, the systems use infrared lighting to scan number plates at around one per second on cars travelling up to 100mph (160km/h) (McCahill&Noris 2002). They are used by police forces on electronic toll collection roads, as well as for monitoring traffic activity. ANPR can also be used to store images captured with a photograph of the driver. Roving video surveillance cameras form of CCTV is used in police cars and can be scan over 200 license plates per minute. The captured numbers can be compared to a master database of registered vehicle to search for matches for stolen vehicles or other illegal reasons (Cambon, 2007; Muller & Boos, 2004).

In evaluating CCTV as an effective safety tools for solving crime and security, this part will explore its uses for helping police, for crime prevention/reduction and for building feelings of security. CCTV system can provide warning signs of potential criminal offences and act as a reactive tool. CCTV monitors crowds and individuals, responds to threats and thus notifies the operator(s) of harmful behavior and actions before, during and after the occurrence of an event (McCahill&Noris 2002). For example, video surveillance cameras have been extremely useful in identifying the offender of the 1994 bishop gate bombing and the July 7, 2005 London bombings (Switzerland Federal Department of Police and Justice, 2007). In Barcelona, video surveillance cameras allowed authorities to find a young Spanish man who aggressively attacked a Latin-

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American man in the metro (Cambon 2007). Such events have spread awareness on the effectiveness of the system as a safety tool for solving crime and security.

Countless research studies have demonstrated the CCTV systems are effective tool to manage since they are less expensive and are more efficient in detecting or preventing criminal offences and security activities

### **Food Security**

Food availability is synonymous with food security and Carletto, Zezza and Bonerjee, (2013) identified the elements of a strategy built around a combination of short term fixes, and long term methodological innovation in food measurements and monitoring. Mathematical skills are used to calculate food security indicators such as:

Household Food in Security Access Scale (HFIAS);

Household Dietary Diversity Scale (HDDS) – measures the number of different food groups consumed over a specific reference period (24Hrs/48 Hrs/7 days);

Household Hunger Scale (HHS) – measures the experience of household food deprivation based on a set of predictable reactions captured through a survey and summarized in a scale.

Coping Strategies Index (CSI) – assess household behavior and rates them based on asset of varied establishment behaviours as how households cope with food shortages.

Food Security can be explicitly explained using mathematical variables as percentages, rates, graph and numbering.

### **Economic Security**

Economic security is measured using economic indices to measure the economic well being of a nation. Mathematical skills are utilized to measure these indices. One primary indicator used to gauge the economic health of a country is the Gross Domestic Product (GDP). A negative GDP is a sign of recession which signifies unhealthiness while a positive GDP implies healthiness. Other economic indicators that requires mathematics skills are: Human Capital Index (HCT), Education Index (EI), Mean Years of Schooling Index (MYSI), Expected Years of School Index (EYSI), Income Index (II) and Consumer Price index which is used to measure reflection ultimately, the aspects of ratio, percentages, ordinal counting and algebra of numbers are essential Mathematics to be used to be able to Interpret the economy of any nation.

### **Conclusion**

The paper concludes that Mathematics skills have been of great help in solving crime and security problems in Nigeria. Mathematicians should therefore rise up and play a prominent role in solving crime and security problems in Nigeria. Based on this, the recommendations of the paper should be given absolute implementation in order to save most Nigerians.

### **Recommendations**

- A significant number of graduates of mathematics and applied science should be enlisted into the nation's security manpower structure to elicit critical logical reasoning.
- Qualified mathematics teacher should be encouraged to handle the subjects starting from primary level to secondary level.

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- Government should employed senior and competent mathematics experts to conduct researches so that the outcomes can assist Nigeria in combating the nation's security challenges
- Government should continue to provide functional mathematics education at all levels since it is paramount in crime and security problem solution
- Government should encourage the use of cryptograph and CCTV systems which can be used in solving crime and security problems

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