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Assessment Of The Security Preparedness And Adherence To International Civil Aviation Standards At Wilson Airport, Kenya.

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ABSTRACT:-The aviation sector is one of the most important sectors for any country especially its ability to promote interconnectedness within countries as well as between countries. However, the sector faces many risks caused by various emergencies and accidents associated with the sector, and much so in the precincts of airports. The impact of these accidents causes monumental social, economic and environmental consequences to victims. The exponential growth of the sector in the country calls for special attention by relevant stakeholders to devise strategies to address disaster preparedness issues. This is especially due to the fact that the country has already experienced a number of aviation disasters and mishaps related to the industry. Consequently, this study sought to assess the security preparedness and adherence to international civil aviation (ICAO) standards at Wilson airport. This study was carried out at Wilson airport located in Nairobi West. The qualitative design was applied in this study to analyze and describe the effects of land use changes on airport and flight safety in a rapidly growing aviation sector. A total of respondents 216 respondents were targeted by the study (including 150 members of the community, 30 aviation regulators, 30 air operators and 6 service providers) out of which 195 responded (including 132 members of the community, 28 aviation regulators, 29 air operators and 6 service provider) giving a response rate of 90%. Primary data was collected by use of questionnaires, interview guide and Focused Group Discussions while Secondary data were collected from written or published records and maps from the Kenya National Bureau of statistics. Quantitative data was analysed by use of descriptive statistics such as frequencies and percentages while qualitative data was analysed using content analysis. On the general security of Wilson airport, the study found that 22 (38.6%) of the respondents indicated that the Wilson Airport is not safe.Regarding the safety and security of Wilson Airport, the study found out that 37 (64.9%) of the respondents disagreed that the entry gates at the airport are under tight security control, 36 (63.2%) of the respondents disagreed that the entry into airport buildings are under tight security control and25 (43.9%) of the respondents disagreed that the security personnel at the airport are well trained. Regarding adherence to ICAO standards, it was found that protection of security areas from unauthorized access, the use of signs providing a deterrent by warning of facility boundaries as well notifying of the consequences for violation and identification systems for employees or authorized tenant access to various areas of the airport was done to a small extent.

Key Words:-*Airport security, ICAO standards, preparedness*

I. INTRODUCTION

An airport incident can occur anywhere, at any time – day or night, under any weather condition, and varying degrees of magnitude; it can occur instantly or develop slowly; it can last only a few minutes or go on for days (United States Department of Transport, 2009). It can be natural, such as a hurricane or earthquake, or it can be 'man-made', such as a hazardous materials spill, civil unrest, terrorism, and major fire or power outage. Moreover, emergencies of the same type can differ widely in severity, depending on degree of warning, duration, and scope of impact (United States Department of Transport, 2009).

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According to Gooch (2007), airport aviation increases the economy of a nation by providing employment globally. For instance in Canada, the airport industry generates $8 billion dollars and provides 150,000 job opportunities annually. The International Civil Aviation Organization (2006) noted that 2.1 billion passengers travelled by flight globally. This has great influence on global markets. Airport aviation improves global socio-economic development. However, there is growing concern over increasing aviation-related disasters globally. Most of these disasters occur when aviation and related businesses around airports are increasing thus posing enormous risk and dangers to the immediate precincts as well as to adjoining airports. Though aviation disasters occur worldwide, there is special concern for aviation disasters in Africa (Kwiatkowski, 2001). The potential for disaster exists everywhere, and there is resultant devastating cost: suffering and loss of life and. Emergencies are perceived as low probability events and preparedness requires time and finances. This often results in planning needs being overlooked. Lack of planning can cost airports and communities a high price including: health and safety problems, social disruption, lawsuits, negative publicity, liability, post-emergency psychological effects. While every contingency cannot be anticipated and prepared for, a strong emergency preparedness programme can limit negative these impacts.

Dannat (2002), observes that air transport has remained one of the most regulated and restrictive industries in international trade. Domestic deregulation and liberalization progress at an uneven pace and liberalization of the international markets has yet to overcome numerous obstacles. Air carriers therefore need to build extensive global networks to realize economies, scope and density and meet consumer demands. The need for expansion and the increase in consumer demand therefore brings the global aviation industry into perspective.

In the last two decades, Kenya has witnessed a number of fatal aviation disasters including the Busia (24th January 2003), Marsabit (10th April 2006), Narok (14th June 2008) and Ngong plane (10th June 2012) disasters in which prominent Kenyan political, administration and civil servant leaders have lost their lives (Mutugi and Maingi, 2011: 40). Reports on inquiries into these disasters have pointed to poor aviation environments and non-compliance with international aviation standards and regulations (Mokaya and Nyaga, 2009). Separately, a report by the Aviation Safety Networks (ASN, 2010), provides data of several aviation accidents that have occurred in Kenya between the years 2006 and 2009. The report further observes that it is evident that 50% of the air accidents occurred during take-offs, 28.6% during landing and 21.4% during cruise. Take-offs and landings accounted for 78.6% of the accidents. This is despite the fact that Kenya is a signatory to the International Civil Aviation Convention (ICAC) that sets the standards and regulations to which airports and aerodromes must conform (Mokaya and Nyaga, 2009).

Suda (2000) states that the development of airfields and airports in Kenya requires terrain that is level and free of artificial obstructions in the vicinity. This is similar to other global scenarios. As a result of these factors, airports have tended to develop on large flat sites and affect their social environment and vice versa. Airports originally constructed far from town are becoming embedded in metropolitan areas that grow around them. People live and work much closer to the airport fence than airport and city planners anticipated.

The Kenya Association of Air Operators (KAAO) has constantly warned that airports such as Wilson Airport pose real danger to aviation security and safety due to encroachment onto airport space by residential and commercial buildings, which ultimately renders flight paths invisible to pilots and inhibits smooth take-off and landing. Wilson Airport is currently facing an acute problem of encroachment onto its flight path by exponential real estate developments. Considering it is an airport with approximately 120,000 landings and take-offs annually, as reported by the Kenya Civil Aviation Authority (KCAA, 2007), these encroachments pose a real risk on safety.

Despite the increase in threats to aviation safety challenges in Kenya, the KCCA, in response to the national developmental goals envisioned in the Kenya Vision 2030, has put in place measures to ensure Kenyan air operations meet international safety and security requirements to meet the international standards including: infrastructural facilities, communication facilities, and security checks (Hudson, 1997). To achieve this, the Authority needs to augment its capacity to deliver quality regulatory oversight services and ensure its compliance to civil aviation regulations (Kenya Vision 2030 Blueprint, 2009).

Africa's aviation disaster record, and the question marks raised especially by key stakeholders in the aviation industry such as KAA, Association of Air Operators and KCAA concerning compliance to aviation standards and regulations in Kenya, presents researchers and scholars an opportunity to examine these issues in a detailed and systematic way to help reverse the negative aviation record in Kenya and Africa (Oladele, 2005). This study examines the Kenyan aviation disaster risk preparedness context with and recommends means to mitigate disaster occurrence and enhance disaster risk preparedness. It also adds value to aviation studies in the country.

1.1 History of Wilson Airport

The history of Wilson Airport (WAP) dates back to the First World War. Commercial routes were pioneered by Imperial Airways and its successor British Overseas Airways Corporation (BOAC) in the 1920's. In July 1929, Wilson Airways Ltd was formed by Mrs. Florrie Wilson to operate from an airfield in Dagoretti Corner, Nairobi. Later, the airport was relocated to the present site of Wilson Airpor and originally called Nairobi Aerodrome. The construction work was carried out by the Public Works Department. By 1933 two murram (non-tarmac) runways had been laid. The Imperial Airways then commenced operation of an airmail service to Kisumu in July that the same year (http://www.kaa.go.ke/airports/wilson).

In 1962, the GoK renamed the aerodrome 'Wilson Airport' to honour its founder. Today the airport has expanded to become a major domestic airport, a gazetted border control point accommodating short-haul scheduled domestic flights and services, international, and private and charter flights. Wilson Airport is situated at latitude 0118's and longitude 36 48'49"E, 5km from the Nairobi city centre, and borders Nairobi National Park to the immediate south. It is ICAO Class 2, Category 5, and holds the code HKNW. Currently, Wilson Airport is one of the busiest airports in terms of aircraft movement in East and Central Africa. Domestic flights constitute 90% of the total flights from the airport with international flights accounting for 10%. The airport is a fast and convenient gateway from Nairobi into Kenya's magical interior. Destinations served from the airport include Maasai Mara, Mombasa, Amboseli, Lamu, Diani, Lokichogio, Nanyuki and Kilimanjaro. It is also a modern hub of general aviation in East and Central Africa (https://www.kaa.go.ke/airports/wilson).

1.2 Problem statement

Wilson Airport Nairobi is the smallest of the two civil aviation facilities in the city. The airport, which is used mostly by general aviation traffic, caters for both international and domestic traffic. The facility is mainly used by tourism, agriculture and health sectors of the economy. Wilson Airport handles about 120,000 landings and take-offs every year, most of it local and regional traffic. As a result of faster check-in times and fewer flight delays, as compared to Nairobi International Airport, Wilson Airport is commonly used by business executive aircraft for both domestic and International travel. Common domestic destinations from Wilson Airport include Kisumu Airport, Mombasa International Airport and Eldoret International Airport.

Despite existence of comprehensive policies on aviation safety in Kenya, critical aviation safety challenges continue to emerge in the existing airports. Over the past decade, Wilson airport has faced different challenges ranging from constrained spaces and aviation related accidents. The airport is constrained by expansion and development space largely due to expansion of aviation businesses as well as developments in its adjoining neighbouring areas. Among the many security and safety concerns raised have been encroachment into airport space with claims that illegal structures and numerous other high-risk business developments within and around the airport have significantly affected flight safety in the airport. All these increasing infrastructural developments pose a threat to aviation activities at the airport.

Different studies have been done in airports in Kenya. Mukaria (2013) did a study on knowledge, awareness and conformity to International Airport emergency preparedness standards: the case of Wilson Airport in Nairobi, Kenya. The study found that dissemination of information among stakeholders was average resulting into low cooperation in the cases of emergency at the Wilson Airport. Obwaya (2010) did a study on disaster risk reduction strategies in preparedness at Jomo Kenyatta International Airport (JKIA) Nairobi Kenya. He found that JKIA plans, facilities and personnel cannot handle a large-scale disaster. No study has been done on the effects on land use changes on airport safety in Kenya. This study therefore assessed the security preparedness and adherence to international civil aviation (ICAO) standards at Wilson airport.

II. LITERATURE REVIEW

This section presents theoretical and empirical review

2.1 Chaos Theory

One counter to the linearity of the lifecycle approach was to explore whether ChaosTheory which emphasizes multi-directional causality and lack of predictability hasutility for understanding crisis management. Chaos theory is built on the two ideas hatsystems, no matter how complex, rely on an underlying order, and that within suchsystems very small changes or events can cause very complex behaviors or outcomes.

Recognition of this non-linear interaction between components prompted Murphy (1996) and later Seeger (2002) to advance the application of chaostheory to crisis management. Chaos theory suggests that it is impossible to detect simple linear cause and effect relationships. Instead, there are many variables that interact in convoluted ways to produce disaster. Chaos theory would thus recommend that vulnerability be reduced by addressing multiple variables simultaneously.

The theory of chaos stresses that the world does not necessarily work as a linear relationship with perfectly defined or with direct relations in terms of expected proportions between causes and effects. The chaos occurs when a system is very sensitive to the initial conditions. These initial conditions are the measured values for a given initial time. The presence of chaotic systems in nature seems to place a limit on our ability to apply physical deterministic laws to predict movements with any degree of certainty. Indeed, one of the most interesting subjects in the study of chaotic systems is the question of whether the presence of chaos may or may not produce ordered structures and patterns on a wider scale. In the past, the dynamic systems showed up completely unpredictable and the only ones who could aspire to be understood were those that were represented by linear relationships, which are not the rule. On the contrary, there are some situations clearly isolated.

Chaos theory was used to explain how response to disasters may compromise its management. Focusing on how the airport is prepared to prevent and handle disaster cases, the theory helped in explaining how any disasters and disconnect in handling disasters would compromise disaster management.

2.2 Airport Security and Adherence to International Civil Aviation Standards Federal Aviation Regulations (FAR)

A detailed analysis of Federal Aviation Regulations (FAR) 107 and 108, and their implementation, requires some understanding of the specific security characteristics of U.S. airports. This sub-section therefore provides a profile of the current U.S. airport security system by discussing the following:

a) **Operational Classification of Airports**

Airports are classified into three categories according to the annual level of passenger boardings (enplanements) the airport conducts. This classification system assists the Department Of Transportation (DOT) in identifying airports that serve public air transportation, that are critical to supporting national security, and that are eligible for federal aid (Wells, 1996). The three airport operational categories are: 1) commercial service, 2) general aviation (GA), and 3) reliever.Commercial service airports receive scheduled passenger service and have 2,500 or more annual passenger boardings. There are currently 566 commercial service airports in the U.S. Commercial airports are partitioned into two sub-classifications: 1) Primary, and 2) Other. Primary Airports are commercial service airports with 10,000 or more annual enplanements. There are currently 417 primary commercial service airports in the U.S. The remaining 149 commercial airports are classified as other commercial service airports with 2,500 to 10,000 annual enplanements.

General aviation (GA) airports are those with fewer than 2,500 annual enplanements. There are currently 2,424 GA airports in the U.S. Reliever Airports are a special category of GA airports that are located in the vicinity of major commercial airports. These airports are specifically designated by the FAA as GA airports that provide relief to congested major airports. To be classified as a reliever airport, the airport must have at least 50 permanent based aircraft, manage 25,000 itinerant operations from other airports or 35,000 unscheduled transient aircraft operations within the last two years (Wells, 1996). There are currently 329 reliever airports in the U.S.

b. Security Classification of Airports

Unlike the operational classification, airports are also classified into six security categories according to the annual number of passengers screened for security purposes. The six airport security categories are Category X, and Category One through Five. Airports that require the highest level of security are Category X. Currently U.S. airports retain this classification. The following types of airports may be designated Category X: Airports where 25 million or more persons are screened annually, Airports having 1 million or more international enplanements and Airports with special considerations (e.g.; history of incidents, airports in unique locations such as those serving Washington, D.C.).

Category One airports are those where more than 2 million persons are screened annually. Category two airports are those with at least 500,000 but less than 2 million persons screened annually. Category three airports are those with less than 500,000 persons screened annually. Category four airports are those that conduct screening for flights that deplane passengers into a Sterile Area (SA) at another airport, in this case the total number of persons screened is insignificant. Category five airports are those where screening is not required and that serve aircraft seating 31 through 60 passengers.

c. Security Responsibilities

Provision of security in U.S. air travel is the responsibility of: 1) the FAA, 2) airports, and 3) air carriers.

i) Federal Aviation Administration (FAA)

The FAA is responsible for ensuring the safety of air travel through the establishment of security requirements, inspection of airline and airport security operations, and by issuing civil penalties for noncompliance with those requirements. The operational role of the FAA in airport security is limited to the dissemination of intelligence and threat information.

ii) Airports

Airports are responsible for security on airport property. They are charged with providing a secure operational environment for the air carrier. To achieve this, the FAA has established security requirements for the response of law enforcement to various security threats, physical security such as airport perimeter fencing, and access restrictions to operations areas. Specifically, airports are responsible for securing access to the Airport Operations Area (AOA) by controlling the movement of persons and vehicles and providing the general law enforcement response to any security breaches or problems.

iii) Air Carriers

Air carriers are responsible for the most visible security measures. These measures include the screening of passengers and carry-on baggage, including training and testing of persons responsible for the screening, securing the aircraft against the introduction of any explosive or incendiary devices, monitoring and securing all sterile areas under their control, and controlling the handling and loading of baggage and cargo (Bush Commission, 1990). Air carriers may contract with private security firms to perform this function, and the carriers at a given airport will often work together. Nevertheless, the FAA holds the individual air carriers accountable for the effectiveness of screening operations.

d. Classification of Security Areas

Effective security areas are a critical cornerstone of airport security. This requires clear definition of security areas, establishment of baseline security requirements for designated areas, and effective enforcement of established security procedures for these areas. The FAA has identified five such security areas: 1) Air Operations Area (AOA), 2) Secure Area (SA), 3) Security Identification Display Area (SIDA), 4) Sterile Area, and 5) Exclusive Area (EA).

i) Air Operations Area

As explained in FAR 107, airport operators are required to designate a portion of the airport where security measures are applied to protect areas used for landing, taking off, or surface maneuvering of airplanes. As defined, the AOA encompasses the (1) runway, (2) taxiway, (3) ramp, (4) parking, (5) tarmac, and (6) undeveloped areas within the airport perimeter.

FAR 107.13 defines requirements for operators of airports serving scheduled passenger operations where the certificate holder of air carrier is required to conduct passenger screening under a program required by FAR 108. Airports shall use the procedures included, and the facilities and equipment described in its approved Airport Security Plan (ASP), to perform the following functions: 1. Control access to the AOA, including methods for preventing the entry of

Unauthorized persons and ground vehicles. 2. Control movement of persons and ground vehicles within each AOA, including, when appropriate, requirements for the display of identification. 3. Prompt detection and action to control each penetration, or attempted penetration, of an AOA by person whose entry is not authorized in accordance with the Airport Security Program (ASP).

ii) Secure Area

The Secure Area (SA) was created by the issuance of FAR 107.14 in January 1989 in response to the 1987 Pacific Southwest Airlines (PSA) disaster. The SA encompasses the area where air carriers enplane passengers, deplane passengers, sort and load baggage, and any adjacent areas that are not separated by security controls or physical barriers (GAO Report, 1995). Under FAR 107.14, access control systems must: ensure that only authorized persons gain access to the SA, immediately deny access to persons whose authorization is revoked, differentiate between persons with unlimited access to the SA and persons with only partial access and be capable of limiting access by time and date.

iii) Security Identification Display Area

Almost three years after FAA required airports to designate the Secure Area within airports, they mandated airport operators to implement additional identification display and training procedures to provide even more protection to carrier aircraft within a portion of the AOA. This new area, designated the Security Identification Display Area (SIDA), includes portions of the AOA which overlap with the SA. Per FAR 107.25, this area is defined as any area identified in the airport security program as requiring each person to continuously display on their outermost garment, an airport-approved identification medium unless under airport-approved escort.

SIDA areas vary from airport to airport. For example, San Francisco/Oakland (SFO) International Airport designates the entire AOA a SIDA, whereas Los Angeles (LAX) International Airport designates only specific areas of the AÖA as SIDA. Though designated SIDA areas vary per airport, FAA requirements do not. Per FAR 107.23 no airport may issue to any person any identification media that provides unescorted access to any SIDA unless the person has successfully completed training in accordance with an FAA-approved curriculum specified in the ASP. No person may use any airport approved identification medium that provides unescorted access to any SIDA unless that medium was issued to that person by the appropriate airport authority or other entity whose identification is approved by the airport operator. Examples of "other entities" include the FAA, U.S. Customs, and tenant air carriers. The airport operator shall maintain a record of all training given to each person under this section until 180 days after the termination of that person's unescorted access privileges.

iv) Sterile Area

Per FAR 108.3, the Sterile Area is an area to which access is controlled by the inspection of persons and property in accordance with an approved security program used in accordance with FAR 129.25. Specifically the Sterile Area is the public area entered after passing through passenger screening checkpoints. Security of the Sterile Area is the responsibility of the air carriers.

v) Exclusive Area

The Exclusive Area (EA) is a dedicated area for which carriers are responsible for physical security in their operational areas leased from the airport. This area includes air operations, cargo buildings and airline spaces within the terminal building. Specific responsibilities include the SIDA requirements, access control system hardware, and procedures identified in the FAA approved ASP.

e. Security Alert Levels

In order to ensure that the FAA, airport operators, and air carriers are able to respond on short notice to civil aviation threats, a system of four security alert levels was devised. Security alert levels are comprised of a myriad of contingency action plans devised for identified threats and vary according to the severity of the threat. Contingency responses can be as subtle as increasing the number of on duty security personnel or as stringent as disallowing curbside check-in, prohibiting visitors from security areas and/or physical hand searches of all baggage. The FAA is responsible for declaring alert levels and contingencies to put in place. The FAA uses two tools for threat notification and contingency requirements: Security Directives for air carriers, and emergency ASP amendments for airports, both of which are time based. Expiration dates trigger a timely review of the threat and determine continuance, modification, or elimination of a countermeasure.

The FAA has the authority to direct the implementation of actions at specific operations (airports/air carriers) subject to the threat, instead of industry wide. The security levels are listed below according to the severity of the threat, with Level One being the least severe and Level Four being the most severe: Level One is implemented when current political tensions may lead to hostile demonstrations or low level attacks against U. S. citizens or interests. Level Two indicates that there is information that suggests that groups known to have attacked civil aviation may be preparing actions against U.S. citizens or interests or civil disturbances which could affect civil aviation. Level Three indicates that there is information that a terrorist group or hostile entity with known capability of attacking civil aviation is likely to carry out attacks against U.S. interests, or that civil disturbances with a direct impact on civil aviation have begun or are imminent. Level Four is the highest threat level. This level is implemented when available information confirms that terrorist organizations with demonstrated capability are planning an attack against U.S. civil aviation and the highest level of security possible is required to protect U.S. air travelers.

f. Airport Security Tools

As indicated in the news media and current literature, there is no technological "silver bullet" available today to solve the complexities of airport security. The only true silver bullet is a system of layered defenses which terrorists must successfully infiltrate to reach their objective(s). The structure of a layered defense is unique to each airport facility, but the common requirement of all airport facilities is interaction of human resources and technology. Technology being used across the U.S. today is a combination of both old and new systems. This section provides descriptions of the following technologies currently employed in some, but not all, U.S. airports: 1) Electronic Detection System, 2) Conventional Weapon Detection, 3) X-ray, and 4) Security Access Control.

1. Electronic Detection System

Plastic explosives have replaced guns, knives, and dynamite as terrorist weapons of choice. SEMTEX and C4, two of the most common brands of plastic explosives, pose serious problems for traditional metal detection systems because they have no metal content. Early Explosive Detection Systems (EDS) specifically designed to detect SEMTEX and C4 had high false positive rates making them unsuitable for employment. Today a technological breakthrough in EDS has yet to be discovered, however, the two systems currently being tested in Category X airports, have shown promise.

i) InVision CTX-5000

The In Vision CTX-5000 is the only luggage screening device certified by the FAA as an EDS for plastic explosives and other weapons that are essentially "invisible" to all previously utilized security equipment. The CTX 5000 offers a three dimensional slice through the suitcase, like a medical CAT scan, that gives information on both the shape and density of materials, and can automatically alert an security employee to suspicious objects (Earl, 1997).

This new technology has proven to be a significant technological advance in bomb detection, and is being fielded throughout the world. Though large (6 ft. x 14 ft.), costly ($1,000,000 per unit), and relatively slow (150 bags per hour), thirty-two CTX units have been sold worldwide. Only five CTX units are in operation at category X airports in the United States today, three of which are located at SFO, Atlanta-Hartsfield, and New York's John F. Kennedy (JFK). This is due to FAA funding constraints, and the U.S. government's classification of this technology as a research and development project instead of a procurement project.

ii) Ion Mobility Spectroscope (IMS)

While the CTX 5000 searches for large concentrations of explosives, portable trace detection systems are used to detect small or trace amounts of explosive material. Commonly known as "sniffers" these detectors are used for screening passengers and carry-on baggage for minute amounts of chemicals. Portable systems of this type are actively being used at sterile area screening points in some Category X airports. IMS screening is performed on suspect as well as randomly selected baggage.

2. Weapon Detection

Since 1972 the U.S. has been utilizing Magnetometers (metal detectors) to search passengers for detection of firearms, knives and other metal-based weapons. Magnometers have proven to be a highly successful in thwarting hijacking. However, these devices were not designed for nor can they detect explosives. All passengers must be screened prior to entering the sterile area through use of a stationary walk-through device. Hand held magnetometer devices are used to pinpoint magnetic based items on individuals who fail walk through screening.

3. X **ray**

As with Magnetometers, x-ray devices have been in use since the early 1970's as the primary weapon detection device. Displayed images indicate object density, and image interpretation is a function of the screeners' training and abilities. All carry-on items and checked international baggage are required to undergo x-ray screening, however, checked domestic baggage is not (Melinda, 1997).

4. Security area access control

Key to an effective access control program is positive control of security areas. Airports have installed different types of equipment in different locations. Some airports screen persons at checkpoints, while other airports have installed controls on doors beyond such checkpoints. Some airports have installed controls on both sides of doors leading into and out of the security area (Wells, 1996).

To secure doors and gates, magnetic stripe card readers (with and without integrated key pads), proximity card readers, biometric readers, electronic fences and passenger exit lanes control systems are utilized. Some airports have guarded gates with magnetic stripe card readers to separate passenger and cargo operations areas. Additionally, some airports have mounted closed circuit television cameras at doors and gates while others have chosen not to install such technology (Wells, 1996). This subsection describes the types of technology available for use in an access control system

i) Magnetic Stripe Card Readers (MSCR)

MSCR have been in existence since the early 1960's for control of entry points. The heart of a MSCR system is a central mainframe computer or an integrated network of Personal Computers (PC). Individually issued magnetic stripe cards (magnetic media) act as keys to access the system (Ken, 1998). With this system the employee "swipes" the magnetic media through the reader to open the controlled door or gate. Advantages of a MSCR system is speed and ease of changing entry access codes, control of access through date and time, digital database of personnel accessing specific areas, and difficulty of duplicating cards (Ken, 1998).

ii) MSCR with integrated keypad

Essentially the same system as a MCSR except personalized codes must be entered in unison with swiping of a magnetic media. This system reduces the possibility of area access by individuals using stolen or misplaced media.

iii) Proximity Card System (PCS)

PCS uses infrared technology for area access. PCS manufactures use data transmission and encryption methods between the tag and reader that can't be counterfeited. With this system, the employee holds the card within a few feet of the reader to gain access. Unlike a MCSR, media proximity media never touches the reader and therefore wear is not a function of usage. Ease of use, convenience, speed and maintainability are notable qualities of this system. Many MCSR systems are being replaced by PCS systems (Ken, 1998).

iv) Biometric Identification System (BIS)

BIS is a state-of-the-art security system. Two of the most common BIS techniques are retinal scan and hand scan. While retinal scan systems identify individuals by unique retinal properties, a hand scanner maps hand geometry using Three Dimensional (3D) techniques (Computer Attendance Systems, 1998). While both systems are available, only the hand scan system is currently being used in U.S. airports today. San Francisco International (SFO) is one such airport using this technology.

v) Electronic fence

Airports with general aviation (GA) facilities have unique access control problems. General aviation, unlike airport and air carriers, is made up of local and transient civilian private pilots, self-employed mechanics, and Fixed Base Operator employees. In order for GA to operate in a SIDA, all users would require SIDA media. This would be a challenging if not impossible endeavor to manage. To facilitate the airport's airport security plans and eliminate SIDA requirements, electronic fences are being used at some airports. Electronic fences are invisible barriers that use sensors to detect movement and trigger an alarm to alert security personnel when breached.

vi) Passenger Exit Lane Control System

This system is designed to prevent entry into Sterile Areas through exit lanes. The motion-sensor system issues an audible warning, flashes security lighting and produces a photo of the individual within seconds of activation. The system is independent of breach speed (walk, run, crawl) and can catch a person going the wrong way against a crowd of as many as 20 persons. This system is currently installed at SFO and Minneapolis/St. Paul International (Ott, 1996).

vii) Closed Circuit Television Systems (CCTV)

Airports of all categories use CCTV as part of their security system. CCTV has the ability to detect and record movements of personnel entering access control areas as well as selected ingress and egress points on the airfield (Madline, 1998).

African aviation disaster management efforts have been described as passive (Momoh and Akinyede, 2008). This is in contrast to the relatively better developed economies of Europe and America which have made remarkable strides in disaster management and reduction. In 2008, the Institute of Security Studies (ISS) Report showed that Africa suffers from major concerns and challenges in aviation security and safety (Kapchangah, 2008) than most parts of the world. The report says that African aviation is in a very bad state of affairs and that most of the concerns are associated with African aviation lack of compliance with international aviation guidelines. One the other hand the ICAO regional report indicates that safety is the urgent priority for Africa (ICAO, 2011)

In terms of addressing most African aviation problems, the continent has been blamed of having country by country efforts to address problems instead of addressing the issues collectively (Oladele, 2005). The result of this has been that there has been disunity especially in award of airworthiness certificates for aircrafts and pilots. This has meant increased risk and vulnerability to aviation disasters in the continent. Other experts have also raised similar issues concerning the air safety issues (Phillips, 2002).

Since the 1970’s terrorism has grown, looking towards the aviation industry as a target. On the 22nd of July 1968, an El Al flight destined for Tel Aviv was hijacked. The hijacking was a bold political statement where passengers were to be traded for Palestinian terrorists imprisoned in Israel. By attacking the Israeli airline they were effectively attacking the Israeli state (Hoffman, 1998). In addition to this, the intense media coverage given to the hijacking saw the event publicized all over the world. Aviation became the perfect target for terror, which since 1968 has endured a rapid rise of these attacks. Planes were spaces that could be controlled easily; the fear of crashing subduing any passenger resistance. Airports also offered limited surveillance of the throngs of people that were travelling. The likelihood of a successful hijack has even been calculated, at 76% it is an obvious incentive for terrorists (Merari, 1998).

Due to the increasing risks from terrorism and illegal immigration, airports had to find a way to take control of the airport space. Developments of airport security and surveillance were initially felt through actual changes to the space – to the architecture of the airport. Zukowsky notes that, “Intensified security measures changed the planning of airports, deliberately cutting up the open flow of space” (1996: 15). The development of the sterile lounge concept (Wallis, 1998) saw baggage and security checks made before entrance to the gate. This removed the chance of threatening objects reaching the plane by person. Security checks could then be completed in a purpose built room far away from the gate to reduce queues disruptive to passengers. These techniques are still regarded as the preferred method, evident in the centralized security ‘choke points’ in most terminals (NRC, 1999). Surveillance has become therefore, one of the primary means of ensuring that airports are made safe and secure. ‘Threat vectors’ (NRC, 1999) that is, the paths by which threats may enter the airport and find their way to a plane are identified and monitored. A number of approaches and their implications are presented in the following subsections.

III. SORTING PASSENGERS

Monitoring passengers equally, proved to be far from the truth of running an international airport (Jenkins, 1998). Airport authorities needed a way of putting passengers under surveillance without having to examine every passenger rigorously. For this, methods of passenger screening and profiling have been developed to effectively sort the most probable threat to security from other passengers.The most recently publicized and perhaps most worrying form of surveillant sorting at airports has come through a surveillance technique known as profiling. Profiling is the ability for information or data about an individual to be built up. People may be sorted into profiles of particular consumer groups. The psychological profiles crime investigators use is an obvious example. Profiles are then used to predict a person's likely behaviour or the likely characteristics a criminal may embody. Profiling also usually relies upon vast quantities of information gathered about someone that are then stored and shared. In light of the growth of international terrorism, a new form of profiling has been developed called Computer Assisted Passenger Pre-Screening (CAPPS) in the United States. It is possible to discuss here some of the issues surrounding profiling and its potential impacts.

Profiling was introduced in the US on the recommendations of the Al Gore led White House Commission for Aviation Safety and Security following the Trans World Airlines (TWA) flight crash of 1996. The Commission found that, "passengers could be separated into a very large majority who present little or no risk, and a small minority who merit additional attention" (1997). The rationale behind profiling is then to concentrate upon the minority – those likely to be a threat, rather than the majority, which requires much greater resources. The recommendations were based upon the practices of the airline El Al who used profiling techniques to fit the descriptions and likely behaviour of terrorists to passengers. CAPPS is reported to work by matching likely terrorist behaviour with present airline flight information. A flagged 'selectee' will then be subjected to personal checking of possessions and perhaps an interview and questioning. The passenger's baggage will also be subject to increased surveillance, through additional scans and personal checks.Of obvious concern here is the possibility of discrimination towards particular passengers, biases being held towards ethnicity, and national origin – a person becoming sorted based on personal prejudice. Although, the Gore Commission report stated that it must be ensured that, "selection is not impermissibly based on national origin, racial, ethnic, and religious or gender characteristics" (1997). Problems are also clear over the secrecy of these profiles and the categories passengers become inadvertently pushed into. The lack of control passengers have over these profiles has led to concerns that innocent travellers may be unable to rid themselves of the 'selectee' status of their sorting.

The repercussions of September 11th have seen the re-organisation of US airport security under the Transport Security Administration, itself under the newly formed Department for Homeland Security. Bolstered by this restructuring of governance, President Bush's developing and renamed Terrorist Information Awareness Program and rumours of the testing of CAPPS II have caused concern throughout privacy awareness groups. Posted to the US federal register on January 15th of this year, the TSA introduced a new system of records and amendment of the Privacy Act known as "Aviation Security Screening Records" (DOT, 2003) designed to facilitate the CAPPS II system. The proposal was open to comment and provoked a massive response from individuals and privacy awareness groups. The prime concern behind this system is again the discrimination and segregation of passengers, and also the sharing of passenger information between multiple government agencies. However, not only the sharing of Personal Name Records (PNR) are at stake (Bennett, 1999), but the vague details of the report does not count out the possibility that more detailed banking records, tax histories and other sources of information may become easily passed between airports and other state departments.

Fortunately, in Europe, different rules apply. In March 2003, the European Parliament moved to reverse an agreement made between the European Commission and the United States that would have forced PNR records to be transferred from European airlines to US airports. Another version of CAPPS II was posted to the Federal Register on August 1st with several revisions made upon the January version. At present, however, the majority of concerns lie in the current testing of CAPPS II, particularly with regard to the JetBlue controversy. The popular airline JetBlue illegally transferred a large number of passengers' records to an agency working for the US government (Singel, 2003). The information was to be used for the testing of passenger profiling on internal flights. Some of this information became public and was publishedto the Internet. A similar scheme has also been argued to be taking place through Galileo – the computer reservation system (CRS) that runs a large part of air travel reservation in the US.

IV. THE READ SORT

Other forms of surveillant sorting are occurring through biometric technologies. Biometry is the measurement of the body. Biometrics effectively treats the 'body as text'; identifying specific body parts such as the iris, face and palm signatures to identify the individual (Ploeg, 1999). The use of biometrics extends far beyond air travel, forensic evidence such as fingerprints are commonly used to identify suspects. Nevertheless, biometrics has also become popular at certain US and European airports. Biometrics work by containing detailed records of a passenger's body information (Delio, 2003), the most popular being retina patterns, but this may also include finger prints, DNA matching and face recognition (Agre, 2001) to name but a few. This information and passengers' identities are then stored on cards or a central database to be compared. Biometric systems are usually referred to as authentication systems, where a positive match to the stored information authenticates the identity (Clarke, 2003). However, other biometric systems, referred to as identification systems, compare the captured body data to large amounts of records kept on other databases. Here, passengers are not proving their identity; rather, airport authorities are identifying them.

Biometric systems are of obvious concern to proponents of privacy rights, the critique and defence of biometrics coming from several different philosophical perspectives of technology and human agency (Ploeg, 2002). One particular view is to critique biometrics for their treatment of passengers as objects. Much like a piece of baggage to be identified by a bar code, passengers' bodies offer similar bar codes to be read by authorities. Objections have also been raised over the penetration of bodies as biometric systems scan passenger identifiers.

Others may analyse biometrics from the perspective of how the information is stored, particularly over the ease by which data may be shared with other 3rd parties. The possibility for data to be hacked and misused by external sources is another issue. Ploeg (2002) discusses problems over the security of the American immigration service INSPASS authentication scheme at Los Angeles airport. Recorded hand geometry data was designed to be stored only on the card carried by the passenger. However, van der Ploeg illustrates that the card, if lost, would be quickly replaced by INSPASS thereby revealing the storage, somewhere, of this supposedly private information. But biometrics also has several surveillant sorting implications. For example, we can look to the effects upon the movement of passengers. Schiphol airport, Amsterdam has a fully working biometric system developed by the airport and the Dutch immigration service. The 'Privium' scheme is an 'authentication' scheme that, for 90 euros, allows enrolled passengers to bypass busy queues and check in delays. Passengers are then sorted into those enrolled by the scheme and those not. The logic behind these systems is similar to profiling in that it then gives more time for additional security measures to be placed upon those not enrolled in the biometric scheme.

The systems therefore virtually sort passengers' information but also work to materially sort passenger's mobility within the terminal. The business 'kinetic elites' (Graham and Marvin, 2001) may pass through to the VIP lounge at speed. And yet, the average traveller, forced to park long distances from the terminal, is excluded from member's club lounges and has to endure waiting in lengthy 'check-in' and security queues.

V. DIGITIZING THE SUVEILLANT SORT

Finally, the sorting of passengers has also begun with the introduction of what can be known as digital surveillance, or most commonly algorithmic surveillance (Norris, 2002; Graham and Wood, 2003). Of course, CCTV has become one of the predominant modes of surveillance within airports as well as within cities, shops and indeed on my own university campus. The ability for CCTV to pick up deviant and threatening behaviour has been well documented, as well as its use in identifying suspects. Within airports, its continued and extended application has become a clear priority of airport security concerns. In the UK, the Wheeler (2002) report on airport security suggested that valuable improvements have been made in this area.

A technology now widely used at airports in the United States is a system called Exit Sentry developed by Cernium. Exit Sentry is able to monitor the direction of movement of passengers walking through the exit corridor of secured areas of an airport terminal such as arrivals. A passenger walking the wrong way, trying to enter the secured area through the exit corridor is warned with a flashing light. If the suspect then persists, a siren alerts security staff, and a recording of the suspects' movements is made. Systems such as Exit Sentry are exemplary of recent algorithmic surveillance technologies that in real time analyze CCTV footage of spaces. These systems understand the differences in movement of individual passengers, and may filter out static background information. Threats are not identified by a particular property of an object; rather, particular movements are inscribed with meanings of what is an allowed movement and what is considered suspicious and deviant. The uses for such technologies have been suggested to recognize the movements of car thieves and even people contemplating suicide at quiet train platforms (Norris, 2002). Indeed, research in progress at Southampton University has developed an approach called gait recognition that may be able to identify the identity of individuals by their distinctive walking styles. CCTV algorithmic surveillance effectively sorts and differentiates between mobility, in Exit Sentry's case, that is accepted (non-threatening) and that is unacceptable (threatening). The meanings are not essential to the mobility picked up by the cameras; rather the algorithms are imbued with these meanings.

VI. SORTING OBJECTS

I now move beyond my discussion of airport surveillant sorting, towards a sorting of a different kind. Here I want to discuss the non-humans that have become placed under surveillance at the airport. As I have discussed airports are obviously places of human mobility. And yet, objects and things also intersect these spaces. Baggage flows through the baggage systems miraculously arriving at our destination. We carry on duty-free, cigarettes, and alcohol. But we are only aware of a tiny spectrum of the surveillance systems that place objects under this scrutiny. Initially, the sorting of objects and things at airports has occurred through the physical arrangement of airport spaces. For instance at the re-building of Templehof, the architect Ernst Sagebiel made the innovation of separating passengers, goods and baggage onto different levels of the airport (Braun, 1995). In addition, freight could arrive by an underground train opposite to the subway from which passengers arrived. This form of sorting is still used today, as automated baggage handling systems operate behind the holes in which our luggage disappears.

The monitoring of our luggage at airports is probably one of the most visible methods of surveillance. Contaminating or illegal goods must be stopped. Airports are also nervous over the possibility of explosives and other weapons that may be used for terrorist activities. The identification of these objects is therefore one of the prime duties of airport security and immigration control as they concentrate upon ‘threat vectors’ (NRC, 1999). These objects may be identified and put under surveillance in a number of ways. If we first take hand luggage, the classic examples are probably the phase induction (PI) metal detection systems (Jenkins, 2002).

Memorable scenes in films depict passengers unable to pass through these archways due to a belt or keys. At this point in a person’s journey, hand luggage is usually x-rayed. X-ray machines are able to look inside a person’s belongings, where operators search for suspicious looking objects, these include explosives, arms, and organic material. Although these x-ray systems, according to FAA research, could also be used upon passengers (NRC, 1996). X-ray operators could easily identify passengers carrying concealed weapons, without having to resort to personal body searches.

Objects such as metals and sharp objects become a threat when held by a passenger. They have the potential to become a risk to the plane or the airport. The agency of a threat becomes possible because of the stable network of actors such as a knife, a passenger and indeed a plane. However, objects may take the shape of a threat independently of a person. For example, timer device explosives may be set in advance or barometric sensor devices respond to changes in pressure. Much like Latour’s (1999) example of a sleeping policeman (speed bump), where the agency of a policeman to deter speeding becomes deferred onto the speed bump, here, the terrorists will or agency is given to the bomb. It is this deferred relationship that has led airports to implement baggage reconciliation: Positive Passenger Bag Matching (PPBM) recommended by the White House Commission (1997) in the United States. These systems are designed for the possibility that terrorists are not willing to blow themselves up when detonating a bomb. The terrorist would then check their bags onto a flight without actually boarding the plane. The PPBM system automatically flags up the bag that has been put onto the flight without an owner, the bag may then be pulled from the flight. Such a system relies upon the ability of the airport to know where a passenger’s luggage is, through most recently, radio frequency (RFID) tagging and even individual trays that a bag is placed onto. Baggage handling systems most commonly use bar code technology however, so that baggage can be read to determine the identity of its owner and the flight it should be on.

Surveillance technology has necessarily become more intense in an attempt to secure aviation from these objects. It is also much easier for airports to scan checked baggage than to actually interrogate a human subject. And yet, similarly to passenger screening, airports have not had the staff or equipment to check every person’s bag. As such, the scanning of baggage has been linked to the CAPPS profiling systems so that a ‘selectees’ luggage is put under increased surveillance and identification for threats. For example, the Explosive Detection Systems (EDS) were initially used to scan ‘selectee’ passengers’ bags for traces of explosives. Here, a ‘selectee’s’ baggage is that scanned by the EDS machines. Since the events of 9/11 efforts have been made to increase the installation of EDS machines to ensure every passenger’s bag is scanned, this has culminated in the International Civil Aviation Authority (ICAO) recommending that 100% hold scanning be made by 2006. Other systems use the computer tomography (CT) scanners used in hospitals. A slice or tomography of a bag can then be used to calculate the mass and density of materials that are then matched against explosive and hazardous materials.

Perhaps the object we are most conscious of at airports is the passport. Although, considering the passport’s importance to international travel there has been very little written about it in the social sciences (Torpey, 2000; Caplan and Torpey, 2000; O’Bryne, 2001). And yet, the passport is one of the primary tools of states for the surveillance of their population’s movements. For Torpey (2000), passports provide the means to govern a population’s movement, ‘penetrating’ the individual to ‘embrace’ populations.

Passports are used to identify a person, making a person legible to the state who may then enforce their authority over movement. Passports are also symbols of nation-states and our allegiance to them (O’Byrne, 2001).

Fussell's (1982) Abroad typically articulates the standardization that passports impose upon the traveller: where do people belong, where do they live, what is their hair colour, eye colour. All these aspects of ourselves that we continually negotiate and question become squashed into the tight categories of the passport. For Lofgren (1999): "as a traveller you now had to live up to your passport identity to be able to prove your identity" (19). This is nowhere more obvious than at the airport.

Identification is then one of the primary means of airport surveillance; the display of the passport marks a 'reading' of the individual that occurs at multiple times during their journey. From supplying the ticket at check in, to security, to boarding the plane with your boarding pass and then landing and undergoing immigration control in the destination country, the passport must be displayed many times in the airport. It has become integral to the ritual of international travel. Airport staff and workers must also supply, not their passport, but a similar identification card to access areas of the airport. Indeed, airport vehicles must also be identifiable, clearly bearing company insignias and paint designs. In terms of mobility this is vital, passports and identity cards govern where a person, airport worker or object may go. Passports are a marker of our identity. Identities are read and given mobile and spatial limits by states and airports as they regulate mobility.

VII. AIR TRAFFIC CONTROL

We can also look outside the terminal to airspace for examples of non-human surveillance. Airspaces are territorial units but they also act as highways for the traffic of aircraft, these spaces must also become monitored and controlled for the purposes of security and safety. At the dawn of civil aviation, the organization of plane movement was described as "decidedly sketchy in nature" (quoted in Wegg, 1995: 115). The pilot had to rely upon skill and sight, and had no knowledge of local weather conditions. In order for the aviation industry to provide efficient and safe travel, it was essential that more could be known about environmental conditions. The first known aviation weather station in the UK was introduced at Croydon airport in 1921 (Wegg, 1995).This surveillance of weather and the general environment is perhaps an increasingly common trend for surveillance. Brazil's System for the Vigilance of the Amazon (SIVAM) developed by Raytheon provides a huge environmental monitoring system to show signs of illegal drug trafficking; mining and logging that have previously gone undetected in the rain forest.

Still, the monitoring of weather is obviously not the only concern of air traffic control. As was quickly found in the 1920's crashes were most likely to occur around airports, where planes in the air and on land found it difficult to avoid each other. The need to orchestrate these movements proved paramount to safety. For this, Air Traffic Control (ATC) developed at airports, reinforcing the idea of an airspace that could be vigilantly monitored and controlled for the purposes of both safety and security. Again, at Croydon airport, the new terminal built in 1928 featured an ATC. The tower, or "chart house" scanned for incoming aircraft and maintained radiotelephony (RT) communications with planes. The towers therefore monitored all the positions of incoming and taking off aircraft. Un-identified or enemy planes could also be monitored from an ATC.

More sophisticated radar technologies have since developed, the air traffic control radar beacon system (ATCRBS) being one. After takeoff, aircraft turn on their transponders that send signals recognized by equipment at air traffic control that may then monitor not merely the position of an aircraft but also the unique identity of the flight can be gained from the transponder signal. Air traffic control, can then manage and organize the airspace for the most efficient and safe flow of aircraft. A similar system has also developed on the ground at airports so that 'aircraft incursions' – planes wandering onto runways without permission – may be avoided. This has usually been completed using a pair of binoculars; however, problems arise during periods of low visibility in bad weather and particularly fog. Airport surface detection equipment (ASDE) is a radar system able to locate and monitor planes movement, combined with tower automated ground surveillance system (TAGS) aircraft and indeed, any other airport vehicle may also be identified on the ground surface (Wells, 1996). Although, it must be noted that newer airspace surveillance is moving considerably away from the control tower as power is given back to the planes. Instead, decentralized forms of surveillance are becoming evident in the form of intelligent on-board systems that allow each aircraft, and airport land vehicles to monitor each other's position.

VIII. METHODOLOGY

This study was carried out at Wilson airport located in Nairobi West. The airport is strategically located only about 5 kilometers from Nairobi city centre. The descriptive design was applied in this study to analyze and describe the effects of land use changes on airport and flight safety in a rapidly growing aviation sector. A total of 216 respondents were sampled for the study including 30 aviation regulators, 30 air operators, 6 service providers, and 150 members of the community.

This population has been targeted due to its significant role in either determining issues of preparedness for disaster and risk or being potential causes of disasters and risks at Wilson airport. This study collected primary and secondary data. Primary data was collected by use of questionnaires, interview guide and Focused Group Discussions while Secondary data were collected from written or published records and maps from the

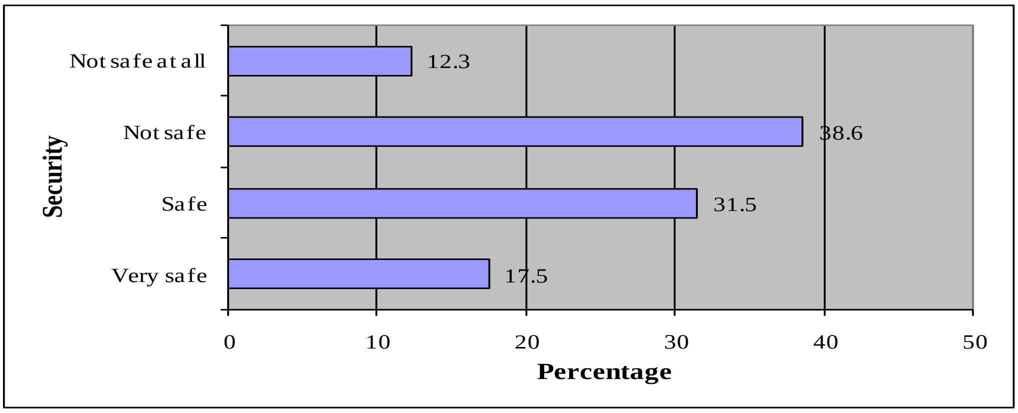
Kenya National Bureau of statistics. Qualitative data was analysed by use of descriptive statistics such as frequencies and percentages while qualitative data was analysed using content analysis.

4.0 Findings of the Study

4.1 Security preparedness and adherence to international civil aviation (ICAO) standards at Wilson airport

Rating of the General Security at Wilson airport

The respondents were asked to rate of the general security at Wilson Airport is not safe as indicated by 22 (38.6%) of the respondents; 18 (31.5%) indicated that Wilson Airport is safe; 10 (17.5%) indicated that Wilson Airport is very safe; and 7 (12.3%) of the respondents indicated that Wilson Airport is not safe at all. The findings are in line with the report by the Institute of Security Studies (ISS) on the same airport, showing that Africa suffers from more concerns and challenges in aviation security and safety than most parts of the world (Kapchangah, 2008). The report adds that African aviation is in a very bad state of affairs and due mainly to African aviation's lack of compliance with international aviation guidelines. The ICAO regional report indicates that safety is an urgent priority for Africa (ICAO, 2011). The results are as presented in Figure 1 below.



Source: Author (2014)

Figure 1 Rating thegeneral security at Wilson Airport

4.5.2 Safety and security at Wilson Airport

Regarding the safety and security of Wilson Airport, 37 (64.9%) of the respondents disagreed that entry gates at the airport are under tight security; 36 (63.2%) disagreed that the entry into airport buildings is under tight security control; 25 (43.9%) disagreed that the security personnel at the airport are well-trained; 38 (66.7%) disagreed that staff and employees are trained on disaster risk preparedness; 39 (68.8%) disagreed that there is adequate security screening at the entrance of the facilities at Wilson Airport; 29 (50.9%) disagreed that fire extinguishing facilities are available and adequate in the buildings at the airport; and 37 (64.9%) disagreed with the statement that the airport has adequate CCTV surveillance. In terms of addressing most African aviation problems, Africa is begrudged for having country-by-country efforts to address problems instead of addressing the issues as one region (Oladele, 2005; Se Kapchangah, 2008). This means that airworthiness certificates vary per country for aircraft and pilots and there is increased risk and vulnerability to aviation disasters (Phillips, 2002). The results are as presented in Table 1 below.

Table 1: Safety and security at Wilson Airport

Statement	Strongly agree		Agree		Neutral		Disagree		Strongly disagree		Total (%)	
	F	%	F	%	F	%	F	%	F	%	**F**	**%**
Entry gates at the airport are under tight security control	5	8.8	13	22.8	0	0	37	64.9	2	3.5	57	100
Entry into airport buildings are under tight security control	4	7	7	12.3	2	3.5	36	63.2	8	14	57	100
Security personnel at the airport are well-trained	7	12.3	18	31.6	5	8.8	25	43.9	2	3.5	57	100
There are adequate security personnel at the airport	10	17.5	27	47.4	0	0	20	35.1	0	0	57	100

The airport has adequate CCTV surveillance	6	10.5	14	24.6	0	0	37	64.9	0	0	57	100
Fire extinguishing facilities are available and adequate in the buildings at the airport	10	17.5	18	31.6	0	0	29	50.9	0	0	57	100
The staff and the employees at the airport are trained on disaster risk preparedness	3	5.3	7	12.3	9	15.8	38	66.7	0	0	57	100
There is adequate security screening at the entrance of facilities at the airport	2	3.5	8	14	0	0	39	68.4	8	14	57	100

Source: Author (2014)

The findings on Table 1 show that safety at Wilson Airport is compromised.Mawanda (2003), states that locally, resources are geared towards recovery and reconstruction rather than prevention or an appropriate response to disasters. In addition, previous studies on air disasters focus on those in other countries, not Kenya. Despite the availability of personnel in Kenyan airports to deal with air crashes or disasters, preparedness for disaster management in all airports including JKIA, is grossly wanting. For example, in a simulation of disaster risk preparedness at the JKIA airport in June 2002, it took 37 minutes for ambulances and fire engines from outside the airport to arrive (Mirichu, 2004). Instead of proper planning there was panic (The East African, 2004).

This following sub-section presents the findings on security preparedness and adherence to ICAO standards at Wilson Airport. For security preparedness the study used indicators such as: personnel, aircraft security, airports and facilities, surveillance, and security procedures and communications. This was tested on a five-point Likert Scale of 1–5; where 1 represented 'No extent at all, 2 represented 'Small extent', 3 represented 'Neutral', 4 represented 'Large extent', and 5 represented 'very large extent'.

The scores 'Very large extent' was equivalent to a mean score ranging from 4.1 to 5; 'Large extent' to a mean score ranging from 3.1 to 4.0; 'Neutral' to a mean score ranging from 2.1 to 3.0; 'Small extent' to a means score ranging from 1.1 to 2.0; and 'No extent at all' to a mean score ranging from 0.0 to 1.0. A standard deviation of >1 represented a significant difference in the responses given.

4.5.3 Security requirements and standards for the airport

To test security requirements and standards at the airport, different aspects of them were tested. The following sub-sections present the findings on different aspects.

IX. PERSONNEL PREPAREDNESS

To test personnel preparedness, respondents were asked to indicate the extent to which different aspects of personnel affect disaster risk preparedness. This was tested on a five point Likert Scale of 1–5; where 1 represented 'No extent at all', 2 represented 'Small extent', 3 represented 'Neutral', 4 represented 'Large extent', and 5 represented 'Very large extent'.

The score 'Very large extent' was equivalent to a mean score ranging from 4.1 to 5; 'Large extent' to a mean score ranging from 3.1 to 4.0; 'Neutral' to a mean score ranging from 2.1 to 3.0; 'Small extent' to a mean score ranging from 1.1 to 2.0, and 'No extent at all' to a mean score ranging from 0.0 to 1.0. A standard deviation of >1 represented a significant difference in the responses given. The findings were as presented in Table 2 below.

Table 2: Personnel preparedness

Statement	N	Mean	Std. deviation
Verification of identity of all occupants of the planes	57	1.13	1.245
Operators providing rental aircraft are vigilant for suspicious activities and report them to appropriate officials	57	1.15	1.340
Airport personnel strive to establish procedures to identify non-based personnel and aircraft using their facilities	57	2.16	1.331

Source: Author (2014)

The findings in Table 2 show respondents indicated that personnel at Wilson Airport verify the identity of all occupants of the planes to a small extent (mean score 1.13) and that operators providing rental aircraft are vigilant for suspicious activities and report them to appropriate officials to a small extent (mean score 1.15). These findings show a vast difference with the setting in the U.S. where the findings of the Transportation Security Administration (2002) revealed that through the introduction of TSA baggage screening in 2002, all airlines had to either adopt positive bag matching, in which they matched each piece of checked luggage to a passenger on board a flight, or screened checked baggage for explosives using one of four methods: explosion detection systems (EDS), explosion trace detection (ETD) machines, bomb-sniffing dogs, and manual searching of bags.

In the case of U.S, TSA established that the baggage-screening process is configured in three different ways. In most airports, passengers first check-in at the ticket counter, and then take their baggage to a screening area, where it is screened using either ETD or EDS machines. In most other airports, passengers first have their baggage screened and then proceed to the ticket counter to check-in. In each of these cases, if the electronic screening technology indicates the presence of explosives or other prohibited items, then additional manual screening is done (De Lollis, 2003).

The findings also revealed that to a very large extent (mean score 2.16), the respondents were neutral on the statement that airport personnel strive to establish procedures to identify non-based pilots and aircraft using their facilities. There was a significant difference in the responses given on the preparedness of personnel in disaster risk preparedness at Wilson Airport (standard deviation >1).

X. AIRCRAFT SECURITY PREPAREDNESS

To test aircraft security, respondents were asked to indicate the extent to which different actions were taken to ensure the security of aircraft. The findings were as presented in Table 3 below.

Table 3: Aircraft security preparedness

Statement	N	Mean	Std. deviation
Ensuring that door are locks consistently to prevent unauthorized access or tampering with the aircraft	57	2.64	.895
Using keyed ignitions where appropriate	57	3.44	.753
Additionally using an auxiliary lock to protect aircraft from unauthorized use	57	2.74	.681

Source: Author (2014)

The findings in Table 3 show that respondents were neutral with the statement that door locks are consistently used to prevent unauthorized access or tampering with the aircraft (mean score 2.64); additionally using an auxiliary lock to protect aircraft from unauthorized use (mean score 2.74). The findings also revealed that the respondents indicated keyed ignitions where appropriate to a large extent (mean score 3.44). There was no significant difference in the responses given on theaircraft security preparednessat Wilson Airport (standard deviation <1). According to the recommendation by TSA (2002), aircraft operators are encouraged to use auxiliary locking mechanisms to further protect aircraft from unauthorized use. Commercially available options for auxiliary locking mechanisms include locks for propellers, throttles, and tie-downs. Thus, this study found that a lot needs to be done to improve aircraft security at Wilson Airport.

According to the TSA (2002), proper securing of an aircraft is the most basic method of enhancing GA security of aircraft operations. While an effective layer for aircraft security, a lock is simply a delaying device and not a complete bar to entry. Pilots should employ multiple methods or layers of securing their aircraft to make it as difficult as possible for an unauthorized person to gain access to it. Some basic methods of securing a GA aircraft include: ensuring that door locks are consistently used to prevent unauthorized access or tampering with the aircraft, storing the aircraft in a hangar, if available, and locking hangar doors and ensuring that aircraft ignition keys are not stored inside the aircraft.

XI. AIRPORTS AND FACILITIES PREPAREDNESS

To test airports and facilities preparedness, the respondents were asked to indicate the extent to which different activities were carried out to ensure their security. The findings were as presented in Table 4 below.

Table 4: Airports and facilities' preparedness

Statement	N	Mean	Std. deviation
Protection of security areas from unauthorized access	57	1.70	.527
Security lighting systems are connected to an emergency power source	57	2.97	.180
The use of signage to deter entry and warn of facility boundaries as well notify on consequences of violation	57	1.75	.567
Identification systems for employees or authorized tenant access to various areas of the airport.	57	1.93	.442

Source: Author (2014)

The findings in Table 4 show that respondents indicated that protection of security areas from unauthorized access, the use of signage to deter entry and warn of facility boundaries, as well as notify on the consequences of violation; and identification systems for employees or authorized tenant access to various areas of the airport, was done to a small extent. The study also found that respondents were neutral regarding security lighting systems being connected to an emergency power source. There was no significant difference in the responses given on airports and facilities preparedness at Wilson Airport (standard deviation <1). According to TSA (2006), lighting of the area on both sides of gates and selected areas of fencing is highly recommended. Lighting is beneficial for security inspection, and to ensure that fence or gate signage is readable, and that card readers, keypads, phones, intercoms, and/or other devices at the gate are visible and usable. Similarly, sufficient lighting is required for any area in which a CCTV camera is intended to monitor activity. Reduced lighting or sensor-activated lighting may be considered in areas which have minimal traffic during off-peak hours.

XII. SURVEILLANCE PREPAREDNESS

To test on preparedness in terms of surveillance, respondents were asked to indicate the extent to which different security activities were carried out. The findings are as presented in Table 5 below.

Table 5: Surveillance preparedness

Statement	N	Mean	Std. deviation
Airport employee, tenant, and user are familiar with reporting unusual or suspicious circumstances on airport property	57	1.74	.444
Conducting surveillance of facility property, buildings and aircraft is in place	57	2.26	.998
Closed circuit television (CCTV) to deter security breaches at airports is in place	57	1.62	.610

Source: Author (2014)

The findings in Table 5 show that respondents indicated that airport employees, tenants, and users are familiar with reporting unusual or suspicious circumstances on airport property (mean score 1.74), and that closed circuit television (CCTV) to deter security breaches at the airport (mean score 1.62) is done to a small extent. This finding contradicts the finding by Wheeler (2002), who reported on airport security that valuable improvements have been made in this area in the UK. He added that within airports, continued and extended use of CCTV is a priority airport security concern. This is contrary to the situation in Kenya where despite the adoption of CCTV, they are not effectively used in security. Currently, the Government of Kenya has embarked on CCTV surveillance in the country by laying down its infrastructure.

The study also found that respondents were neutral with the statement that conducting surveillance of facility' property, buildings, and aircraft, was carried out (mean score 2.26). There was no significant difference in the responses given on surveillance preparedness at Wilson Airport (standard deviation <1).

XIII. SECURITY PROCEDURES AND COMMUNICATION

To test on preparedness in terms of security procedures and communication, the respondents were asked to indicate the extent to which different activities were carried out to ensure security. The findings are as presented in Table 6 below.

Table 6: Security procedures and communication

Statement	N	Mean	Std. deviation
Coordinating emergency plans as appropriate with nearby jurisdictions is in place	57	1.54	.765
Holding security committee meetings to ensure timely dissemination of security/threat information is in place	57	2.64	.895

Source: Author (2014)

The findings in Table 6 show that respondents indicated that coordination of emergency plans as appropriate with nearby jurisdictions was done to a small extent (mean score 1.54), and that respondents were neutral with the statement that security committee meetings are held to ensure timely dissemination of security or threat information. There was no significant difference in the responses given on security procedures and communicationat Wilson Airport (standard deviation <1). On communication, TSA (2004) recommends that in the event of a security incident, it is essential that first responders and airport management have the capability to communicate. Where possible, they should coordinate radio communication and establish common frequencies and procedures to establish a radio communications network with local law enforcement agencies. One method of accomplishing this is to conduct regular meetings with airport tenants and people who travel by air to discuss security issues and challenges on disaster management; establishing a centralized area for posting of security information; and developing an email alert system.

4.2 Summary of Findings of the Study

On the general security of Wilson Airport, the study found that 22 (38.6%) of respondents indicated that Wilson Airport is not safe; 18 (31.5%) of respondents indicated that Wilson Airport is safe; 10 (17.5%) indicated that Wilson Airport is very safe; while 7 (12.3%) of respondents indicated that Wilson Airport is not safe at all. Regarding the safety and security of Wilson Airport, the study found that 37 (64.9%) of respondents disagreed that the entry gates at the airport are under tight security control; 36 (63.2%) of respondents disagreed that entry into airport buildings is under tight security control; 25 (43.9%) of respondents disagreed that the security personnel at the airport are well trained; 38 (66.7%) of respondents disagreed that the staff and the employees at the airport are trained on disaster risk preparedness such as the use of fire extinguishers; 39 (68.8%) of respondents disagreed that there is adequate security screening at the entrance of the facilities at Wilson Airport; 29 (50.9%) of respondents disagreed that fire extinguishing facilities are available and adequate at the airport; and 37 (64.9%) of respondents disagreed with the statement that the airport has adequate CCTV surveillance.

Regarding adherence to ICAO standards, the study found that personnel at Wilson Airport verify the identity of all occupants of the planes to a small extent (mean score 1.13); and operators providing rental aircraft are vigilant for suspicious activities and report them to appropriate officials to a small extent (mean score 1.15). On aircraft security preparedness, the study found that respondents were neutral on the statement that ensuring that door locks are consistently used to prevent unauthorized access or tampering with the aircraft (mean score 2.64); and also neutral on using an additional locks to protect aircraft from unauthorized use (mean score 2.74). The study further found that protection of security areas from unauthorized access, the use of signage to deter and warn of facility boundaries, as well as notify on consequences for violation; and identification systems for employees or authorized tenant access to various areas of the airport, was done to a small extent.

On surveillance, the study found that airport employees, tenants, and users are familiar with reporting unusual or suspicious circumstances on airport property (mean score 1.74) and that CCTV to deter security breaches at the airport (mean score 1.62) are done to a small extent. Finally, on security procedures and communication, the study found that coordination of emergency plans as appropriate with nearby jurisdictions was done to a small extent (mean score 1.54), and respondents were neutral with the statement that security committee meetings are held to ensure timely dissemination of security or threat information. Thus, appropriateness and adequacy of the existing infrastructure is a determinant of disaster risk preparedness at Wilson Airport.The results of correlation analysis showed that there is a positive correlation between the disaster preparedness and security preparedness and adherence ICAO standards with a Pearson's Correlation Coefficient of $r = 0.815$ and a level of significance of 0.000 meaning that it is statistically significant.

XIV. CONCLUSION

It can also be concluded that even though some security measures have been in place at Wilson airport; a lot needs to be done specifically on security equipment, training of the security staff and adherence to the set ICAO standards.

XV. RECOMMENDATIONS

The study further recommends that Wilson airport should ensure that adherence to the ICAO standards. This will help in reducing the security lapses such as training security personnel, installation of additional relevant security equipment and ensuring effective communication of security information within and outside the airport.

REFERENCES

[1] Agre, P. (2001). Your face is not a bar code: Arguments against automatic face recognition in public places, *Whole Earth* 106: 74–77.

[2] Birger, H. & Jeppe, N. (2005).The epistemological lifeboat.(Online).Retrieved from http://www.db.dk/ (18/11/2010).

[3] Braun, H-J. (1995). The airport as a symbol: Air transport and politics at Berlin-Temple of, 1923–1948 In. W. M. Leary (ed.) From Airships to Airbus: The History of Civil and Commercial Aviation, Volume 1: Infrastructure and Environment. Washington and London: Smithsonian Institution Press, 45–54.

[4] Clarke, R. (2003). Biometrics in Airports How To, and How Not To, Stop Mahommed Atta and Friends. Available online at: http://www.anu.edu.au/people/Roger.Clarke/DV/BioAirports.html

[5] Dannatt, R. (2002), Role and Effectiveness of Government Regulation of Air Transport Safety The University of Western Australia.

[6] Delio, M. (2003). Travelling? Take Big Brother Along. Wired News. 4 April 2003. Retrieved from http://www.wired.com/news/privacy/0,1848,58344,00.html. Accessed on 13th April 2014.

[7] Department of Transportation (2003) Privacy Act of 1974; Proposed Implementation. Proposed Rules. Federal Register (68): 10, Wednesday, January 15, 2003. Available online at: http://www.gpoaccess.gov/fr

[8] Earl, L. (1997). *Dream Machine*, available from vvrww.newsday.com, accessed 1 December 1997.

[9] Graham, S. and D. Wood (2003) Digitising surveillance: categorisation, space, inequality. Critical Social Policy, 23(2): 227-248.

[10] Hoffman, B. (1998). Aviation Security and Terrorism: An analysis of the potential threat to air cargo integrators. In. P. Wilkinson and B.M. Jenkins (eds.) Aviation Terrorism and Security. London: Frank Cass, 54-69.

[11] ICAO(2006) Safety Management Manual Document 9859 1st Edition, Montreal Canada

[12] ICAO. (2011). Regional Report, Africa. November-December 2011.

[13] Jenkins, D. (2002) A Primer on Airport Security. In A. Roberts (ed) Governance and Public Security New York: Campbell Public Affairs Institute, 69-84.

[14] Kapchangah, M. K. (2008). Africa Aviation Security: Implications for Peace and Security. Situation Report, Institute for Security Studies, 15 January 2008

[15] KCAA. (2007). *Rules of the air and air traffic control regulations*. Kenya Civil aviation Authority

[16] Ken, S (1998). *Vendors Corner: Electronic Access*, available from www.nyarm.com, accessed 18 January 1998.

[17] Kenya Vision 2030 Blueprint, 2009

[18] Kwiatkowski, K U, (2001). Expeditionary Air Operations in Africa: Challenges and Solutions,Fairchild Paper .Alabama**:** Air University Press.

[19] Madline, G. (1998). *Floyd Total Security*, available from www.floydtotalsecurity.com, accessed 18 January 2014.

[20] Mokaya, S Chocho, T.A and Kosgey,D, (2009). The Performance of Aviation Regulatory System in Kenya.Paper Presented at the Moi University International Management and Entrepreneurship Conference, August 2009

[21] Momoh, J. A. and Akinyede, J. O. (2008). African Regional Challenges and Position in Space Based Disaster Management and Reduction. *African skies*, No. 12, 2008.

[22] Mukaria, S.M (2013). Knowledge, awareness and conformity to International Airport emergency preparedness standards: the case of Wilson Airport in Nairobi, Kenya. Published Thesis. University of Nairobi.

[23] Mutugi, M.W and Maingi, S.G. (2011). Disasters in Kenya.A major public health Concern.*Journal of Public Health and Epidemiology*, Vol. 3(1), pp.38-42, January 2011.

[24] Norris, C. (2002) From personal to digital: CCTV, the panoptican, and the technological mediation of suspicion of social control. In. D. Lyon (ed.) Surveillance as Social Sorting: Privacy, Risk, and Digital Discrimination.

[25] NRC. (1999) Assessment of Technologies Deployed to Improve Aviation Security: First Report. Panel on Assessment of Technologies Deployed to Improve Aviation Security, National Materials Advisory Board, Commission on Engineering and Technical Systems, National Research Council, Publication NMAB-482-5 Washington, D.C.: National Academy Press.

[26] O'Byrne, D, J. (2001) On Passports and Border Controls. Annals of Tourism Research, 28 2: 399-416 Pascoe, D. (2001) Airspaces. London: Reaktion.

[27] Obwaya (2010). Disaster Risk Reduction Strategies in Preparedness: A case study of Jomo Kenyatta International Airport (JKIA) Nairobi Kenya. Published Thesis, University of Free State.

[28] Oladele S. F, (2005). African Air Transport in the 21st Century: A Case Study of the Contrasting Experience of Nigeria and Kenya. MSc Thesis Cranfield University.

[29] Oladele S. F, (2005). African Air Transport in the 21st Century: A Case Study of the Contrasting Experience of Nigeria and Kenya. MSc Thesis Cranfield University.

[30] Ott, J. (1996). *A Broader Plan, Not a Silver Bullet*, Aviation Week and Space Technology (AW&ST), McGraw-Hill Companies, 7 October 1996: 32–34.

[31] Phillips, E. H. (2002). Aviation Week & Space Technology. Vol. 156, no. 16, pp. 44-51.

[32] Ploeg, I. Van der (1999). The illegal body: 'Eurodac' and the politics of biometric identification. Ethics and Information Technology, 1: 295-302.

[33] Ploeg, I. Van der. (2002) Biometrics and the body as information: normative issues of the socio-technical coding of the body. In D. Lyon (ed.) Surveillance as Social Sorting: Privacy, Risk, and Digital Discrimination. London and New York: Routledge, 57-73.

[34] Senge, P. (1994). Art Kleiner; Charlot Roberts; Richard Ross and Bryan Smith The Fifth Discipline field book: Strategies And Tools For Building A Learning Organization. London: Nicholas Brealey Publishing.

[35] Singel, B. (2003). JetBlue Shared Passenger Data. Wired News. 18th September. Retrieved from: http://www.wired.com/news/privacy/0,1848,60489,00.html. Accessed on 23rd April 2014.

[36] Suda, C. 2000. Natural disaster risk preparedness, environmental degradation and sustainable development in Kenya. Institute of African Studies. *African study monograph*, 21 (3) 91–103

[37] Torpey, J. (2000). The Invention of The Passport: Surveillance, Citizenship and the State. Cambridge: Cambridge University Press.

[38] Wallis, R. (1998) The Role of International Aviation Organizations in Enhancing Security. In. P. Wilkinson and B.M. Jenkins (eds.) Aviation Terrorism and Security. London: Frank Cass, 82-100.

[39] Wegg, J. (1995) The Development and Emergence of Air Traffic Control in the United Kingdom and Europe, 1919-1939. In. W. M. Leary (ed.) From Airships to Airbus: The History of Civil and Commercial Aviation. Volume 1: Infrastructure and Environment. Washington and London: Smithsonian Institution Press, 114-126.

[40] Wells, A.T. (1996). *Airport Planning and Management*, 3rd Edition, McGraw-Hill Companies.

[41] Wheeler, J. (2002). Airport Security: Report by the Rt Hon Sir John Wheeler JP DL. September.13.

[42] White House Commission on Aviation Safety and Security. (1997). Final Report to President Clinton. Executive Office of the President, Washington, D.C., Feb. 12.