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Biometric System and Performance of Selected Hotels in Abuja of Nigeria

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Abstract- Hospitality industry is the economic stream in many parts of the world. With today's increasing terror attacks in Nigeria, it is a great concern that the safety and security of guests and employees' lives and properties be protected. This raises the use of biometric system in hotels. The general objective of the study is to ascertain the extent to which biometric system can affect the performance of hotels in Abuja metropolis. The study seeks to find out specifically the extent of relationship between biometric system and customer satisfaction and the extent to which biometric usage affect competitive advantage of hotels in Abuja. The study is anchored on Expectancy disconfirmation theory. Two research questions and two hypotheses were formulated in line with the specific objectives of the study. The research adopted survey research design. The study worked with sample size of one hundred from the population of five hundred and sixty. Pearson Product Moment Correlation was used for data analysis at 10% level of significance. The findings of research reveal that customers are satisfied with the use of fingerprint scanner and facial dictator for access usage in hotels. The implication of the finding is that if customers are satisfied through the use of biometric system, it will in turn improve the performance level of the hotels. Based on the findings, the study recommends that hotels should provide biometric services to guests as means of registration on check-in and use of any service point in the hote.

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Abstract- Hospitality industry is the economic stream in many parts of the world. With today's increasing terror attacks in Nigeria, it is a great concern that the safety and security of guests and employees' lives and properties be protected. This raises the use of biometric system in hotels. The general objective of the study is to ascertain the extent to which biometric system can affect the performance of hotels in Abuja metropolis. The study seeks to find out specifically the extent of relationship between biometric system and customer satisfaction and the extent to which biometric usage affect competitive advantage of hotels in Abuja. The study is anchored on Expectancy disconfirmation theory. Two research questions and two hypotheses were formulated in line with the specific objectives of the study. The research adopted survey research design. The study worked with sample size of one hundred from the population of five hundred and sixty. Pearson Product Moment Correlation was used for data analysis at 10% level of significance. The findings of research reveal that customers are satisfied with the use of fingerprint scanner and facial dictator for access usage in hotels. The implication of the finding is that if customers are satisfied through the use of biometric system, it will in turn improve the performance level of the hotels. Based on the findings, the study recommends that hotels should provide biometric services to guests as means of registration on check-in and use of any service point in the hote.

I. Introduction

In Nigeria, with the increasing rate of terrorism especially in the federal capital territory and major big cities like Lagos, Port-Harcourt, etc., the security of lives and properties has caused a strain on the performance of most hotels in these cities, leading to decline in demand of patronage.

In as much a guest checking into a hotel is concerned with security but most primarily they want convenience, Biometric system appears to offer the most promising technologies that allow guests to check in and out, access guest areas and make payment with conveniences and speed (Morasan, 2010).

In some countries like Nigeria, for fulfillment of government regulation, hotels must keep a detailed identification records of all guests that patronize the hotels. The main concern of a hotel is to ensure their guest enjoy robust security and comfort in order to maintain continuous patronage.

The Nigerian Tourism Development Corporation (NTDC) in 2013 after discovering the importance of biometric system, entered into a partnership with Orbit Technology and Investment to begin biometric data registration of hotel employees in order to curb fraudulent activities in hotels. This rationale is to create a means of tracing and tracking staff movement within the industry. (Tarpel, 2013).

Rensewe (2012), formal Director-general of NTDC, opined that no foreign investor will come to Nigeria if there are no proper structure in all aspect of our national life and the tourism industry is one of the best and sensitive industries in the world, hence we must do everything to protect the business and ensure security in the sector.

The death rate of people in Nigerian hotels are on the increase as a result of poor security and proper technology that will detect criminals who use hotels as a hide out for their illicit activities. (Rensewe (2012),). Like the incidence of Miss Cynthia Osukogukilled in a Hotel in Lagos.

A step has been made to introduce biometric data records of hotel employees in most hotels but very little has been done with regards to guest or customers' biometric data registration and implementation in Nigerian hotels. (Tarpel, 2013).

Between 2011 and 2013, according to Hotel Owners Forum Abuja (2013), the rate of patronage of hotels in federal capital territory (FCT) from foreign expatriate has declined by 50% as a result of hotel without biometric system of security. (Premium times, 2013).

In July 2012, a young lady Ms. Cynthia Osukogu was killed in a hotel in Festac town Lagos by a group of men who checked her in as business associate. (Vanguard, 2012).

In 2013, a South African Mr. Eric Dominic who visited Nigeria and lodged in a 3-star hotel in FCT, reported that hotels in Abuja do not have report on what happens in the hotel and there are lot of suspected movement in and out of the hotel. (Nigerian Tribune, 2012).

Due to recent terrorism rate in Nigeria, there is a loss in business patronage and poor performance in hotels. The patronage of business in Abuja has declined

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by 50% as a result of terrorism attack in Abuja metropolis. (Premium times, 2013).

This study seeks to find out the extent to which biometric system will enhance the performance of hotels in Abuja.

a) Objectives Of The Study

The main objective of the study is to ascertain the extent to which biometric system can affect performance of hotels in Abuja metropolis.

The specific objectives are:

1. To identify if there is significant relationship between biometric system and customer satisfaction.
2. To identify the extent to which biometric usage affect competitive advantage of hotels in Abuja.

b) Research Questions

In order to carry out this research to fruition the following research question are put forward to guide the course of this study.

1. In what ways do biometric system affect the satisfaction of customers in hotels in Abuja?
2. In what ways do biometric affect competitive advantage among hotels in Abuja?

c) Hypotheses

H_1: There is no significant relationship between biometric and customers satisfaction.

H_2: Biometric does affects competiveness in hotels.

II. Review of Related Literature

a) Conceptual Review

According to National Science and Technology Committee on Homeland and National Security (2004), it defined biometric as a technology that measures and analyzes human body characteristics such as DNA, fingerprints, eye retinas, iris, voice patterns, facial pattern and hand measurement for authentication purpose.

Ives, Du, Etter and Welch (2005), defined biometric system as technology that uses measurable physical, biological or behaviourial characteristics that can be processed to establish identification to perform identity verification or to recognize a person through automation.

While Jain (2004) opined that biometric is the unique (personal) physical or logical characteristics or traits of human body. Physiological traits are related to the shape of the body, for example are, not limited to fingerprints, face recognition, DNA, hand and palm geometry, Iris recognition and scent recognition. While behaviourial trait or sometimes known as Behaviometric are related to person's behaviour and example include, not limited to typing rhythm, gait (pattern of movement of limb) and voice recognition. (Pike, 2007).

According to Abdelbang (2011), Hand Geometry is a method to distinguish or identify the unique person using 90 dimensional measurements to record an accurate spatial representation of an individual hand.

According to Abdelbang (2011), Retina scanning involves an electronic scan of retina, the innermost layer of the wall of the eyeball.

According to Polemi (1997), Iris scanning uses a camera mounted between three and 10 feet away from the person to take a high definition photograph of the individual's eye. It analyzes 266 different points of data from the meshwork of the iris.

According to Ruggles, (1996), Facial recognition attempts to identify subjects according to the facial characteristics such as eye socket position space between cheekbones, color, etc.

According to Abdelbang (2011), Fingerprint recognition systems rely on biometrics device's ability to distinguish the unique impressions of ridges and valleys made by an individual finger.

Technology has become a component of everyday life in nearly every part of the world in this 21st century. Technology use has permeated every segment of the business world. The hospitality industry is no exception that are constantly seeking new technology as a way of daily operation. Biometric is a highly effective to establish identity verification.

Richard P., Devinney T. M, Yip G. S and Johnson G (2009)(2009) defined organizational performance as the encompassing of financial performance, product market performance and shareholder returns.

b) Theoretical Framework

This research is based on the expectancy disconfirmation theory, which states the concept of consumer satisfaction or dissatisfaction.

According to Neo, Devinaga, Yoon Kin Tong, andTeo(2014), Expectancy disconfirmation theory states that consumers purchase goods and service with pre-purchase expectation about the anticipated performance. Once the product has been purchased and used, the outcomes are compared against initial expectation. During comparism, if the outcomes matches expectation confirmation is reached. On the other hand, disconfirmation is achieved when there is a difference between user's initial expectation and outcome.

Negative disconfirmation refers to outcomes which is less than expected and thus the product does not meet user's expectation. On the contrary, positive disconfirmation occurs when the outcome is greater than user's initial expectation and hence the product performance is much better than expected.

In line with this theory, customers that patronize a hotel expect to get ultimate satisfaction for their money. This satisfaction is drawn from the comfort received, security of lives and properties and efficiency

of the services offered from the hotel. If a hotel offers biometric system for guests and employees, customers are more likely to favour that hotel than others without this technology because the expectation result on security well-being of the guests in this period of high insecurity in the country will be satisfied by the hotel with this technology.

c) Empirical Literature

Neo, Devinaga, Yoon Kin Tong, and Teo(2014) carried out research on *"Tourists' Satisfaction on the Use of Biometrics Technology: A Conceptual Framework".*

In this work, tourists' satisfaction was measured by using the variables from different theories. There were seven variables from tourists' perspective to be examined: performance expectancy, effort expectancy, facilitating conditions, physical privacy, accuracy, information privacy and contamination fear. The first five were the performance expectations that tourists could anticipated before the actual use of the biometrics fingerprint system. These expectations need to be disconfirmed to establish whether the actual experience exceeds or falls short of expectations.

They found out fingerprint scanning system designed for mandatory programme were able to break-even point that met tourist's expectation.

The data collected was analyzed with statistical software IBM Statistical Package for the Social Science (SPSS) version 20.

Morosan (2010) worked on *"Theoretical and empirical consideration of guest's perception of biometric system in Hotels: extending the technology acceptance model (TAM).*

The objective of his work was to determine the system in which guests in hotels perceived the use of biometric. The researcher analyzed this work using analysis of variance (ANOVA) and was able to find out that perceived innovativeness toward this technology was found to be a strong predictor of perceived ease of use of biometric system.

Hence, customer would prefer to use a hotel with biometric system. This factor is an advantage edge for a hotel over its counterpart, as innovative and technology lovers would certainly opt for a hotel with biometric system than one without.

Bilgihan A., Karadag E., Cobanoglu C. and Okumus F. (2013) carried out research on *"Biometric Technology Applications and Trends in Hotels".*

The purpose of the study was to investigate the biometrics technologies adopted by hotels and the perception of hotel managers toward biometric technology applications. Members of American Hotel and Lodging Association (AHLA) wereselected as the target population for the study. The findings of the study showed that the most frequent use of biometric technology is by hotelemployees in the form of fingerprint scanning, as cost still seems to be one of the major barriers to adoption of biometric technology applications and there is definitely is a future in using biometric technology applications in hotels in the future. The data collected was analysed by T-test statistics.

Abdelbary A. M (2011) worked on *"Exploration of factors affecting adoption of biometric technology by five-star Egyptian hotel employees".* The purpose of the study was to explore perceptions and acceptance of biometric technology by employees in Egyptian hotels. The findings of the study showed that biometric devices positively influences perception of employees of valued-added to the work place and the knowledge of biometric devices to employees influences the type of devices accepted.

The data collected were analysed Statistical Package for the Social Science (SPSS) version 18.

d) Hotel and Technology

According to Murphy andRottet (2009), the hospitality industry are not different than other industries in the world in need and search of new technology that streamline their daily operation such as property management inventory and electronic point of sales.

Heracleous andWartz (2006) opined that reconfiguration of the way transactions are processed with corollaries of better customer service combined with convenience and ease of transaction will be considered a "driver" for the customer and industry alike.

Abdelbary (2011), suggested the different transactions like identification of guests, security and payment process such as booking, reservation, check-in, payment, customer-specific information requests and use of secure devices in guest rooms and offices could be reconfigured with advance technology.

The application of an advanced technology for this transaction can lead to increase in efficiency, decreased cost, increased revenues, enhanced service and increased ability to compete with other hotels within the industry.

Jackson (2009) posited there seems to be the unleashed potential of technology which could enhance organizational practice to gain competitive advantage and that technology is biometric system.

Since hospitality industry provide a homogeneous product, in which information is driving force and key component, O'Conner and Frew (2002) said it will particularly benefit the industry if addition of technological advancement is augmented to existing technology present in the industry today.

The advancement of technology is ever increasing and hotels have historically lagged behind other industry in implementation of technology especially in Nigeria.

According to Murphy andRottet (2009), 87.3% of leisure guests are favourly pre-dispersed to use

biometric technology for guest service. Unlike other conventional identification method, the personal traits scanned by biometric are difficult to lose, forget or copy for this reason, it is considered to be safer and more secure than other conventional methods such as keycards or passwords.

e) Biometric System and its Application

O'Conner and Frew (2002) said the need for technology to deliver reliable and reproducible service in the hospitality industry is increasing daily.

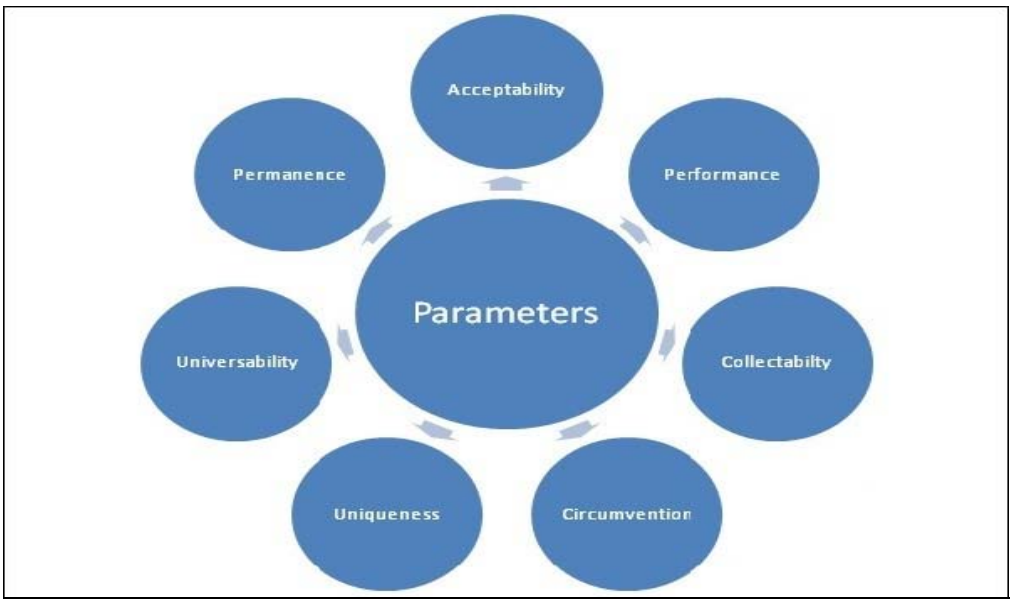
Hotel currently use multiple keys by employees to access areas in hotels to perform their duties as well as gain entry to restricted areas. Human error can result in loss of keys as well as unauthorized individual access to restricted areas or fraudulent activities by employees. Lock change, key replacement and making new password add to cost and inefficiency in operation.

Biometric system is the technology of identifying individual using distinctive physical or behaviourial pattern. Jones and Ruthenbur (2006) posit that biometric system will improve room security, customer convenience, control access to restricted area and limit access to customer's data. The information of access of entry can be printed or retrieved at a later time to determine an entry area in question. Data gotten through biometric are accurate, convenient and cannot be stolen or replicated because it is unique only to one subject.

i. *Criteria For Biometric System*

According to Schucker (2001), there are seven basic criteria for biometric system.

a. Uniqueness
b. Universality
c. Permanence
d. Collectability
e. Performance
f. Acceptability
g. Circumvention



a. *Uniqueness*

This is considered as the priority one requirement for biometric data. It will indicate how differently and uniquely the biometric system will able to recognize each user among groups of user. For instance, the DNA of each person is unique and it is impossible to replicate.

b. *Universality*

This is the secondary criteria. This parameter indicate requirements for unique characteristic of each person in the world which cannot be replicated. For example retinal and iris characteristic of a person.

c. *Permanence*

This parameter requires for every single characteristic or trait which is recorded in the database of the system and needs to be constant for a certain period of time period.

d. *Collectability*

This Parameter requires the collection of each characteristic and traits by the system in order to verify their identification.

e. *Performance*

This parameter outline how well the biometric system works, accuracy and robustness are the main factors of biometric system.

f. *Acceptability*

This parameter will choose field which biometric technology are accepted.

g. *Circumvention*

This parameter decide how easily each characteristics or traits provided by the user can lead to failure during the verification process.

f) Application Fields in Biometric System

There are two application fields in biometric system. They are:

i. Physical access control
ii. Logical access control

The difference between the two access controls are small but can be easily confused.

i. *Physical access control*

According to O'Neil (2011), the physical access control covers identity authentication processes which require users to provide physical characteristics. The most common use for the physical access control application is the access devices which are applied at doors or computers. This application is confidential and important and is entrusted with a high level of security. The physical access control reduces the risk of human problems. It also covers the aspect of data loss in the system. The system helps to eliminate the process of identifying long and complex passcodes with different processes.

Physical access control is not only effective and efficient but also safe, secure and profitable in the workplace.

ii. *Logical access control*

Logical access control refers to a process of a scheme control over data files or computer programs. These contain personal or privacy information of many different users. Logical access control is used by militaries and governments to protect their important data with high security systems using biometric technology.

The only difference between logical access control and physical access control is that the logical access control is used for computer networks and system access control. It helps to reduce the burden of long and complex password requirements for users.

Moreover, it is more secure and effective in the way of protecting and maintaining privacy over data in the system. It also provides a great advantage by saving time and money

g) Types of Biometric System

According to Biometric News Portal (2011), the various types of biometric system are:

i. *Facial Recognition Detector*

The human face is one of the easiest characteristic which can be used in biometric security system to identify a user. Face recognition technology, is very popular and is used more widely because it does not require any kind of physical contact between the users and device. Cameras scan the user face and match it to a database for verification. Thenegative side of face recognition technology is as the user ages over time, the detector finds it difficult to identify the user.

ii. *Fingerprint Reader*

Fingerprint is made of a number of ridges and valleys on the surface of finger that are unique to each human.

According to Biometrics News Portal (2011). "Ridges are the upper skin layer segments of the finger and valleys are the lower segments".

The uniqueness of a fingerprint can be determined by the different patterns of ridges and furrows as well as the minutiae points.

To capture the surface of the fingerprint for verification during the identification of users,two main algorithms which are used to recognize fingerprints: minutiae matching and pattern matching.

Minutiae matching will compare the details of the extract minutiae to identify the difference between one users fingerprint as compared to others. When users register with the system, they will record images of minutiae location and direction on finger surface. When users use fingerprint recognition system to verify their identification, a minutiae image is brought out and compared with the one which provided at the time of access.

Pattern matching will compare all the surfaces of the finger instead of one particular point. It will concentrate more in thickness, curvature and density of finger's surface.

The image of the fingers surface for this method will contain the area around a minutiae point, areas with low curvature radius or areas with unusual combinations of ridges.

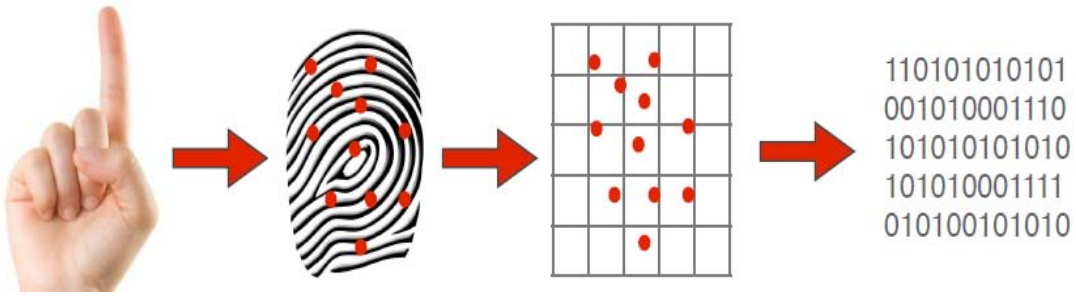
The major disadvantage of finger scanner is damage or having one or more mark on it, will make identification become hard.

iii. *Voice Recognition*

There are two main factors which makes a person's voice unique. One is the physiological component which is known as the voice tract. The Second is a behavioral component which is known as the voice accent. By combining both of these factors, it is almost impossible to imitate another person's voice exactly. Voice recognition will focus on the vocal tract because it is a unique characteristic of a physiological trait. It works perfectly in physical access control for users.

iv. *Iris Scanner & Recognition*

The human iris is a thin circular structure in the eyes which is responsible for controlling the diameter and size of the pupils. It also controls the amount of light which is allowed through to retinal in order to protect the eye's retina. Iris color is also a variable different to each person depending upon their genes. Iris color will decide eye color for each individual.



Biometric Door Lock

Biometric Fingerprint Scanner

Iris recognition systems will scan the iris in different ways. It will analyze over 200 points of the iris including: rings, furrows, freckles, the corona and others characteristics. After recording data from each individual, it will save the information in a database for future use in comparing it every time a user want to access to the system.

During the verification process, if the users are wearing accessories such as glasses and contact lenses, the system will work as normal because it does not change any characteristics of the user's iris.

Theoretically, even if users have eye surgery, it will have no effect on the iris characteristics of that individual.

v. *Veins Recognition*

This is one of the recent biometric technologies invented is the vein recognition system. Veins are blood vessels that carry blood to the heart. Each person's veins have unique physical and behavioral traits. Taking advantage of this, biometrics uses unique characteristics of the veins as a method to identify the user.

O'Neil (2011) said that vein recognition systems mainly focus on the veins in the user's hands.

Each finger on human hand has veins which connect directly with the heart and it has its own physical traits

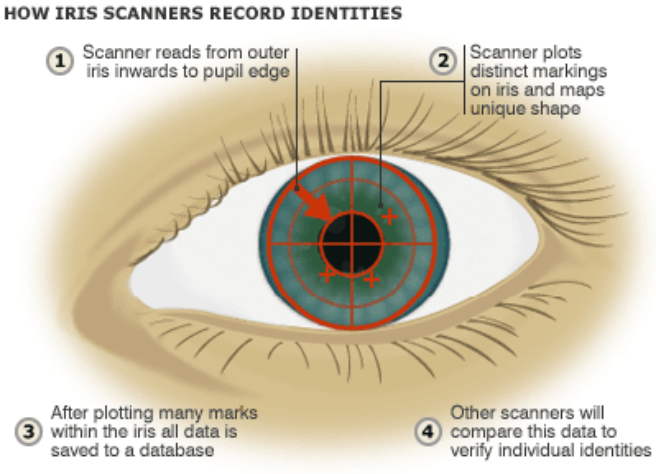
The recognition system will capture images of the vein patterns inside of users' fingers by applying light transmission to each finger. This is done by passing near-infrared light through the fingers by a camera to record the vein patterns.

vi. *DNA Biometrics System*

Each person's DNA contains some trait from his/her parents. DNA profiling will decide the amount of VNTR (variable number tandem repeat) which repeats at a number of distinctive loci. These amounts of VNTR will make up an individual's DNA profile. this technology is new and is hardly applied in public.

vii. *2D Barcode Scanner*

This is a 2-dimesional method of presenting digital security information which is provided by the biometrics technologies system. 2-D barcode is



normally applied during the identification of items rather than users.

This technology is not popular; it can be used for scanning the identity of user's driver license, passport, ID cards, voter cards, etc.

h) Phases of Biometric Operation

According to Abdelbang (2011), the biometric operation consist of the following phases;

i. *Data acquisition*

During this phase, quality is important. If the input is not accurate, the process may not proceed and may require another submission of data.

ii. *Data transmission*

Systems uses two process of transmission, some system self-store and can process at the same location of submission of the information, while other systems transmit the information over the Local Area Networks (LAN), intranet, or internet to other far locations requiring data compression for speedy transfer. This is a critical process and errors can occur; a complex protocol is necessary to ensure accuracy.

iii. *Signal processing*

During this phase, the system is used to either verify the identity of a person or identify an individual among a group. In the verification process, the individual is required to access the system using a personal identification number or a log name for identification and then present the appropriate biometric feature.

The system does a one-to-one comparison to the stored information. In the case of identification.

iv. *Decision*

The biometrics systems have a threshold to make a match or no match based on the quality and match scores. Low scores lead to rejection and high scores compared to the threshold ensure identification.

v. *Data storage*

Data converted to templates are stored locally, on a network, or on portable or external devices based on the needs of the organization.

To further explain the operation phases, using for example, the fingerprint recognition. The fingerprint scanner scans the structure of the finger print picture which contains patterns known as minutiae (valleys and ridges) unique to each individual. Those patterns are stored in templates using encryption algorithms unique to each vendor. Once this information is digitized and stored, it can be recalled with ease and accuracy to identify an individua.

i) Biometric and Security in Hotels

According to Singhal and Jain (2011), biometric technology aims at reducing fraud and eliminating risks associated with security.

Recently, airports, security companies, financial organisation are gradually integrating biometric system applications into their workplace.

Parton (2007) posits that hotels are increasingly seen as soft target by terrorists in the world for being open and accessible. In Days Inn Hotel in Amman, Jordan was attacked by terrorist in 2005, killing 60 people and caused hundreds of injuries. With these world spread of terrorism in the world, biometric system can help in securing the security of hotels.

This has made security an important issue for hotelier particularly at the luxury end of the market.

Also hotels have long suffered security breaches including network and system security, theft by employees and credit/debit card theft. This insurgency can be avoided by use if biometric system.

X. Methodology

The study is limited to five (5) selected hotels in Abuja, Nigeria. The hotels are Rockview Hotel Royale,

Bolingo Hotels, Bolton white Hotel, Dennis Hotel and Emirate Hotel.

The population of the study consists of customers of the selected hotels

Names of hotels	Average no. of customers
Rockview Hotel Royale	100
Bolingo hotels	250
Bolton white hotel	120
Dennis hotel	60
Emirate hotel	30
Total	560

The sample size was determined using Taro Yamane formula. This is statistically determined below;

$$n = \frac{N}{1 + N(e)^2}$$

Where
n= the sample size
N= the finite population
e= level of significance
1= unity

$$n = \frac{560}{1 + 560(0.1)^2}$$

$$\frac{560}{5.61} = 99.8$$

Approx. = 100

The researcher design used for the study is descriptive survey involving the questionnaire administration.Data for the study were sourced from selected hotels in Abuja, Nigeria. Copies of questionnairewere administered to hundred (100) respondents selected from each of the hotels. Data obtained were analyzed using Pearson Product Moment Correlation and descriptive statistics.

Table 1: Biometric System and Security Service

Responses	Frequency	Percentage %
Very good	20	23.8
Good	34	40.5
Average	26	30.95
Poor	4	4.8
Very poor	0	0
Total	84	100

Source: Field Survey, 2014.

Table 1 shows that 34 respondents which represent 40.5% and 20 respondents which represent 23.8% rated hotels security service good and very good respectively. While 26 respondent which constitute 30.95% rated average and 4 respondents which constitute 4.8% rated hotel security service poor.

Table 2 : Finger Print Scanner and Customer Satisfaction

Responses	Frequency	Percentage %
Very good	28	33.3
Good	36	42.9

Average	12	14.3
Poor	8	9.5
Very poor	0	0
Total	84	100

Source: Field Survey, 2014.

Table 2 showsthat 36 respondents which represent 42.9% and 28 respondents which represents 33.3% rated good and very good respectively that finger scanner enhances customer satisfaction, while 12 respondents which represent 14.3% and 8 respondents which represent 9.5% rated finger print scanner enhancer for customer satisfaction average and poor respectively.

Table 3 : Biometric Devices And Guest Privacy

Responses	Frequency	Percentage %
Very good	2	2.4
Good	12	14.3
Average	8	9.5
Poor	28	33.3
Very poor	34	40.5
Total	84	100

Source: Field Survey, 2014.

Table 3 showsthat 34 respondents which represent 40.5% and 28 respondents which represents 33.3% rated very poor and poor respectively rated that biometric system encroach into guest privacy, while other respondents rated the responses good and very good.

a) Testing of Hypotheses

i. *Hypothesis One*

There is no significant relationship between biometric system and customer satisfaction.

Table 4 : Pearson-Product Moment Correlation coefficient between mean responses of use of biometric device and customer satisfaction

	X	DF	Standard Error	r-Cal	r-critical	Decision
Biometric system	4.7	3	0.1	0.97	0.865	Reject H_o
Customer satisfaction	4.0					

ii. *Hypothesis Two*

Biometric system does affects competition in hotels.

Table 5 : Pearson-Product Moment Correlation coefficient between mean responses of use of biometric devices and competitive advantage

	X	DF	Standard Error	r-Cal	r-critical	Decision
Biometric system	4.7	3	0.1	0.96	0.865	Reject H_o
Customer satisfaction	3.86					

IV. Summary of Findings

From the result of correlation coefficient in hypothesis one, it was observed that r = 0.97 which showed a positive relationship between biometric devices and customer satisfaction in Abuja metropolis.

This revealed that using fingerprint scanner and other biometric devices for access identification into any hotel will guarantee high level of security of lives and properties of customers in hotels. This will also provide a more functional security against terrorism, fraudulent activities and privacy of guests, in line with the assertion

of Abdelbang (2011) that different transactions like identification of guest, security and payment processes such as booking, reservation, check in, payment and use of security devices in guest rooms and offices should be reconfigured with advance technology.

From the result of correlation coefficient in hypothesis two, it was observed that r = 0.96, which showed a positive correlation between biometric system and competitive advantage of hotels in Abuja metropolis. This revealed the extent the usage of biometric devices can influence competitive advantage of hotels. The finding explain why hotels in Abuja metropolis should start using biometric devices for guests as this will boost patronage as asserted by HOFA (2013) that the patronage level of business has declined by 60% since the increased terrorist attacks in Abuja metropolis. Also in line with Jackson (2009) that unleashed potential of technology can enhanc organizational practice to gain competitive advantage and that technology is biometric system.

V. Conclusion

The study has shown that biometric system is needed to enhance the performance of hotels in Abuja. Also the adoption of this technology will help them succeed in this period of increased terrorist attack.

VI. Recommendations

Based on the findings, the following are recommended;

1. With the rate of insecurity in Abuja metropolis, hotels should provide biometric services to guests as a means of registration on check in and use of any service point in the hotel. With the new ongoing National Identity Management Commission (NIMC), it will be easier for hotel biometric database to be built up, by linking a network to the national database. Hence, any suspected criminal can be quickly identified at point of access into any hotel.
2. The hotels should adopt the use of biometric device to lessen the burden of keycards and password, especially the cost and time of reproducing them when they are lost.The use of biometric devices of behaviometric trait like typing rhythm, gait or voice recognition should be used as medium of identification and assess to rooms and guests' area of hotel, other than the physiological traits (fingerprint scanner and hand geometry) which are currently in used in most hotels.

Gait analysis is the systematic study of human locomotion, using the eye and the brain of observers, augmented by instrumentation for measuring body movements, body mechanics, and the activity of the muscles. (Levine D.F, Richards J, and Whittle M, 2012).

Whereas, typing dynamics refers to the automated method of identifying or confirming the identity of an individual based on the manner and the rhythm of typing on a keyboard.

Gait recognition and typing dynamics technology are unique biological or behavioral identification characteristic that will be most efficient in detecting of terrorist in hotels and also public areas of the hospitality industry.

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