Acceptance of Visual Docking Guidance System by Ground Marshallers in Nigerias' Airport

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ABSTRACT

This study examines the acceptance of Visual Docking Guidance System (VDGS) by Ground Marshallers in Nigeria's airport, with the increasing volume of air traffic worldwide and the need for information technological development, it has become essential to develop and adopt systems that will efficiently manage the ground movement of aircraft for docking in the airport; this is needed to improve safety, turnaround time and operational efficiency. The study is a descriptive research and the sampling technique is purposive in nature. The research covered twenty (20) respondents (Ground Marshallers) in Murtala Muhammed International Airport (MMIA), and Ilorin International Airport, Kwara state, Nigeria. The small number of sample size was because the device is not installed in most of the airports in Nigeria. The study found that there is an association between the Ground Marshals' awareness about ICT and their opinion that technological change will cause a threat in ground marshalling job; there is also an association between the education level of the Ground Marshals and their likely acceptance of VDGS; and there is an association between the Ground Marshals' knowledge of ICT and the likely acceptance VDGS. Ground Marshals should have in-depth understanding of ICT so as to minimize their beliefs on technophobia and prepare for the fast approaching Fourth Industrial Revolution where there will be full digitized, Artificial Intelligence (AI) and Internet of Things (IoT).

Keywords - **Perception, Ground marshals, Aircraft docking, Visual Docking Guidance System, Nigeria**

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I. INTRODUCTION

Globally, the volume of air traffic is increasing and the need for using more sophisticated information technology is essential. As a result, it has become crucial to develop systems that will properly manage the ground movement (parking ad take-off) of aircraft at the airport, and to improve safety and operational efficiency. Part of the impact of information technology gave birth to the device for the final parking and departure of aircraft on the apron particularly for docking.

According to Safegate group (2012), in the recent, computerized wireless device which is referred to as Visual Docking Guidance System (VGDS) have been widely used in airports situated in the developed countries, for example, in the US, Canada, Netherlands, Chile, United Arab Emirate, Spain, Italy, and so on. It is found that as the level of technology increases, so also is technological advancement in the air transportation.

A docking system (Visual Docking Guidance System (VDGS)) is a computerized device that was developed with the aid of Information Communication Technology (ICT), which guides the aircraft from the taxi-way to the gate position and vice versa? It enables wide-body aircraft to park at the correct position on the parking bays without the assistance of a Ground Marshal. Ground Marshals are trained personnel employed to aid the pilot in guiding the aircraft into the dock. The Ground Marshallers stand ahead of the aircraft in view of the pilot and provide hand signals, including the waiving of bats during the day and lamps at night in order to direct the pilot for steering and stopping the aircraft at the designated stopping point (Adeniran, 2014).

The docking system ensures plane docking safety, proper anchor. It monitors the movement of an aircraft as it approaches the gate for deplaning or enplaning, and provides signals to the pilot so that aircraft can be correctly positioned at the gate. Accurate position of the aircraft requires that the aircraft nose wheel be positioned to within 0.5 meters (0.5m) or about 20 inches (20") of a pre-defined mark on the airfield running surface or tarmac and the aircraft body positioned along a centering line (Safegate group, 2013).

Typically, different marks are delineated for different types of aircraft. The centering line is also usually indicated on the tarmac to help the pilot taxi the plane correctly in the gate area. A docking system must be able to track an aircraft for at least 20meters so that the pilot has enough time and maneuvering room to correct any deviations in aircraft position and/or orientation. The main users of the Visual Docking Guidance System (VDGS) are Pilots and Ground Marshals. This study is targeted at the perception of the Ground Marshals in the acceptance of VDGS.

There are different perceptions of Ground Marshals in Nigeria about this VDGS due to the following: Airport personnel are not usually actively involved in the automation system; Government policies; and phobia that technology is replacing the human jobs. Despite the fact that Ground Marshals are constantly exposed to knowledge of new technologies through continuing education programs, professional training, which helped them benefit from the new technologies in the developed countries, the reverse is the case in the developing countries like Nigeria. The airports in the developed countries are well equipped with appropriate hardware and software (Ramzan, 2004a). The story might be different in the developing nations. It is therefore pertinent to find out if technological change will pose challenge to airport ground marshalling in the developing countries.

Ramzan (2004b) observed that developing nations were not prepared to embrace the changes forced on them by new technologies; and that most of them were uncertain about ICT applications in their area of specialization and benefits for their organizations, because they had little knowledge of ICT. The problems associated with this lack of knowledge are also discussed by various researchers (Mahmood and Khan, 2007; Saeed et al., 2000; Mahmood, 1999; Haider, 1998).

Due to the role of technology in the advancement of society in general and the aviation sector in particular, effective technology integration in the airport and aircraft docking has become the focus of many aviators. However, most related research studies conducted so far focus on ICT applications in other sectors or other dynamics of aviation without necessarily focusing on the airport ground marshalling.

The aim of the study is to investigate Ground Marshallers' perception and acceptance of Visual Docking Guidance System (VDGS). The specific objectives are to examine if technological change will cause threat on ground marshalling job; to determine the education level of Ground Marshals towards the acceptance of VDGS; and to ascertain the relationship between ICT usage and the acceptance of VDGS. The study is limited to Ground Marshals at Murtala Muhammed International Airport 1, Murtala Muhammed Airport 2, and Ilorin International Airport in Nigeria. Lagos airports seem to be the most developed and most patronized airport in Nigeria. Also from the pilot study, the ground marshals in Ilorin have ground marshalling experience with Lagos airport. The airports were also chosen based on convenience and prior investigation.

II. LITERATURE REVIEW

I. T Aircraft marshalling

Aircraft marshalling is visual signaling between ground personnel and pilots on an airport, aircraft carrier or helipad. Marshalling is one-on-one visual communication and a part of aircraft ground handling. It may be as an alternative to, or additional to, radio communications between the aircraft and air traffic control, The usual equipment of a marshaller is a reflecting safety vest, a helmet with acoustic earmuffs, and gloves or marshalling wands, handheld illuminated beacons (Adeniran, 2014).

In the same vein, at busier and better equipped airports, marshals are replaced on some stands with a Visual Docking Guidance System (VDGS), of which there are many types. On aircraft carriers or helipads, marshals give take-off and landing clearances to aircraft and helicopters, where the very limited space and time between takeoffs and landings make radio communications a difficult alternative.

II. Visual Docking Guidance System (VDGS)

In the 1970s, airports and airlines began using standard Visual Docking Guidance Systems (VDGS) to improve safety at the gate. A standard VDGS is designed for ramp positioning only and utilizes both human and mechanical elements to guide pilot's nose-in and stop the aircraft in precise positions to loading bridges and fuel pits. While the level of automation varies by manufacturer, standard docking guidance uses a passive technology and each docking is started manually with a ground agent selecting the proper aircraft type and initiating the docking. The term Visual Docking Guidance Systems (VDGS) are in common usage; the systems are also referred to as Nose-in Docking Guidance Systems or Stand Entry Guidance Systems (SEG). Typical VDGS currently in use, in the UK, include Azimuth Guidance for Nose-in Stands (AGNIS) and Parallax Aircraft Parking Aid (PAPA). Mirrors can be used to provide a pilot's eye view of the nose wheel position. As technology has evolved, major airports have increasingly adopted Advanced Visual Docking Guidance Systems (AVDGS), offering electronically displayed information, such as the azimuth position of the aircraft and stopping distance. In some cases, the AVDGS can determine aircraft type automatically and sets the relevant guiding parameters accordingly (Visual Aids Handbook, 2007).

In the same vein, A-VDGS systems will usually have emergency stop buttons located both on the stand and on the jet-way/gate-area, which causes the stop indication to appear immediately. Docking configurations include; wing docks, tail docks, nose docks, engine docks, pylon access docking, fuselage docking, engine stands, cargo door access, avionics access, crown access and cockpit access.

III. Azimuth Guidance for Nose-In Stands (AGNIS)

AGNIS is one of the most popular forms of guidance that provides stand center line alignment guidance and is normally used in conjunction with PAPA, marker boards, lines or mirrors, which provide stopping guidance separately. The system is designed for use from the left pilot position only and the unit displays two closely spaced vertical light bars mounted in a box at about the flight deck height ahead of the pilot. The light bars display one of the following signals, one red bar and one green bar indicating that the pilot should steer away from the road towards the green bar or two green bars, indicating correct alignment. AGNIS alone provides only azimuth guidance; it does not inform pilots when they should stop. It is relatively imprecise, but cheaper to implement and reliable (Visual Aids Handbook, 2007).

IV. Parallax Aircraft Parking Aid (PAPA)

PAPA is frequently combined with an AGNIS system, informing flight crews when to stop. The device features no electronics or moving parts; it consists simply of a large gray box (usually with one or more side missing) with a large rectangular slot cut into the front. Inside the box, towards the rear, is a white stick or fluorescent tube, which appears to move from one side of the slot to the other as the viewer moves closer, although it is in fact fixed and the effect is merely due to perspective. Above and/or below this slot will be markings in white or yellow, indicating where different types of plane should stop (Visual Aids Handbook, 2007).

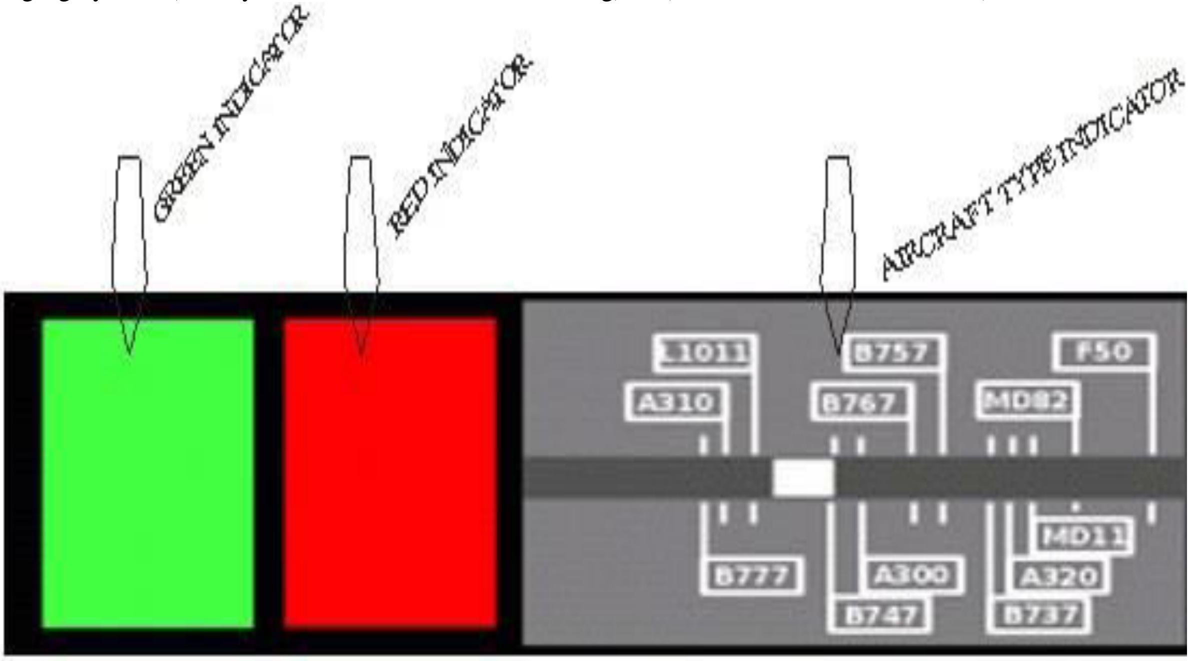

Figure 1: Parallax Aircraft Parking Aid (Papa)

Source: (Visual Aids Handbook, 2007)

In figure 1 above, AGNIS is shown on the left side while PAPA is on shown the right side. As this system relies on the position of the viewer, it will not give accurate distance information to aircraft which have deviated significantly from the standard centerline. In some cases, mirrors may be provided to permit a pilot to view the position of the nose-wheel of the aircraft relative to the stopping position.

Features of VDGS

1. Reliable aircraft recognition independent of its position and orientation;
2. Parallax-free display informing pilot and co-pilot;
3. Passive video sensor system;
4. Sensor installation independent of the lead-in line, even possible in lateral position;
5. Easy integration in front of the terminal building or pole mounting;
6. Utilization of the display also for information to the ground handling staff; and
7. Video monitoring of docking areas also used for monitoring and recording.

V. Description of Visual Docking Guidance System

When the system is activated by the Marshall the following information will be displayed on the LED screen:

1. Type of arriving aircraft.
2. Sequential arrows to indicate the system is active.
3. Lateral guidance with an illuminated 'T' when the aircraft is within 80 meters of the correct parking position.
4. Display of the distance to go when the aircraft is within 9m of the correct parking position.
5. STOP indication when the aircraft is at the correct parking position.

The system is operated only in the Automatic Mode. When the system fails, the aircraft is to be marshaled into the stand manually. Figure 2 shows the Led Display and Laser Scanning Unit mounted on the terminal or pole in front of the aircraft stand.

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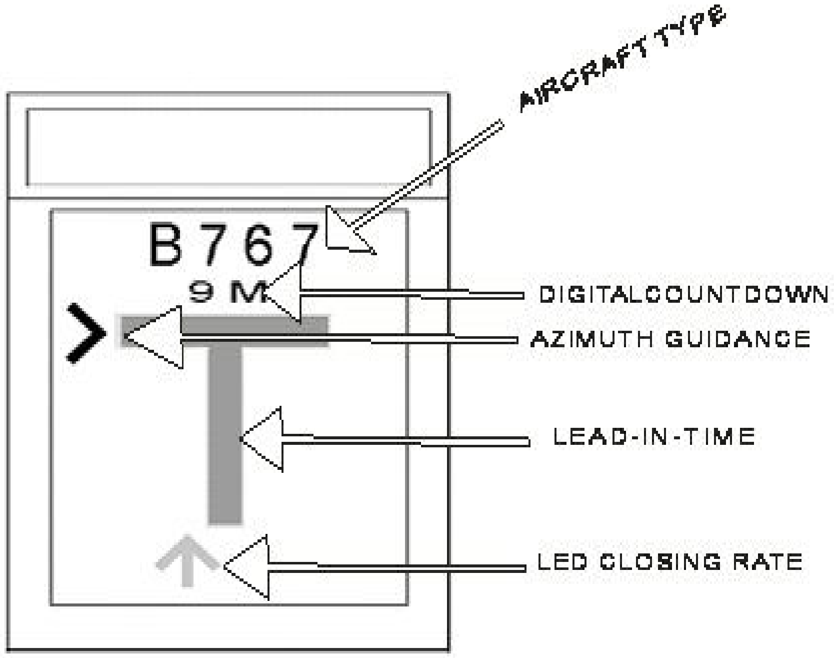

Figure 2: Led Display and Laser Scanning Unit

Source: (Honeywell Airport Systems)

VI. Docking Procedures

The procedures of docking as shown in figure 3 are:

1. Types of Aircraft

Before the aircraft approaches the parking, bay laser scanner identifies the type of aircraft, the marshaller enters the type of aircraft on the Operator Panel in the system and it is displayed on the LED screen. When the aircraft turns into the parking bay and the system starts tracking the aircraft, WAIT will be displayed.

Check that the correct aircraft type is displayed. The scrolling arrows indicate that the system is activated. If the VGDS detects that the type of approaching aircraft corresponds to the aircraft type which the details has been initially input into the system, the docking system will output correctly without displaying error. But if the docking system detects a different type of aircraft as against the initial data coded, the output of the docking system will give error or message ‘STOP’ will be displayed on the LED screen.

2. Tracking Mode

Follow the lead-in line. When the system is activated by the Marshall the laser automatically scans the pre-defined docking area in the parking bay to detect the arriving aircraft. When the aircraft is approximately 80 meters from the correct parking position the laser starts tracking the aircraft and displays information on the lateral position of the aircraft relative to the parking centerline. An arrow represents the location of the aircraft. The system continues to track the aircraft to the ‘STOP’ position.

3. Azimuth Guidance

When the solid yellow closing rate field appears, the aircraft has been caught by the scanning unit. The scanning unit now checks that the aircraft is the correct type and the display provides azimuth guidance information. Look for the flashing red arrow and solid yellow arrow which provide azimuth guidance information. The flashing red arrow shows which direction to steer, while the solid yellow arrow gives an indication of how far the aircraft is off the centerline. Azimuth guidance is displayed on the LED screen when the aircraft is within 80 meters of the correct parking position. An arrow and a chevron indicate the relative position of the aircraft to the centerline ‘T’ symbol.

4. Distance to go Indicator

When the aircraft is 15 meters from the stop position, closing rate information is given. “Distance to go” is indicated by turning off one row of LEDs (Laser Electronic Displays) for every half meter that the aircraft advances towards the stop position. From 15m to the stop position, a digital display will indicate the distance from the stop position for every 1meter. At 3 meters from the stop position, the display will indicate the distance from the stop position for every 0.2 meters. If some object is blocking the view towards the approaching aircraft or the detected aircraft is lost before 12 meters to the correct stop position, the system will show “WAIT”. The aircraft must be identified at least 12 meters before the correct stop position. Otherwise, the display will show “WAIT”, “STOP” and “ID FAIL”. The closing rate to the correct parking position is shown by the proportional reduction in length of the centerline ‘T’ symbol when the aircraft is within 9 meters of the ‘STOP’ position.

5. Stop Position Indicator

The correct parking position is displayed on the LED screen with a ‘STOP’ message, replacing the azimuth guidance and distance to go information. The ‘STOP’ message indicates the exact location of the aircraft nose wheel at the correct parking position. When the system detects the aircraft has stopped, an ‘OK STOP’ message indicates the aircraft is correctly parked. A ‘TOO FAR

STOP' message indicates the aircraft has overshot the correct parking position.

6. Pilot Procedures

The Pilot should not turn an aircraft into the parking stand if the docking system is not activated or on seeing a wrong aircraft type displayed on the system. Hence, Pilots must check that the correct type of aircraft is displayed on the LED screen. When using the docking system, pilots are two taxis into the aircraft stand at minimum speed. The system will display “SLOW DOWN” to inform the pilot if the aircraft's taxiing speed is too fast. To avoid overshooting, pilots are advised to approach the stop position slowly and observe the closing rate information displayed. Pilots should stop the aircraft immediately when seeing the “STOP” display or when given the stop sign by the aircraft marshaller.

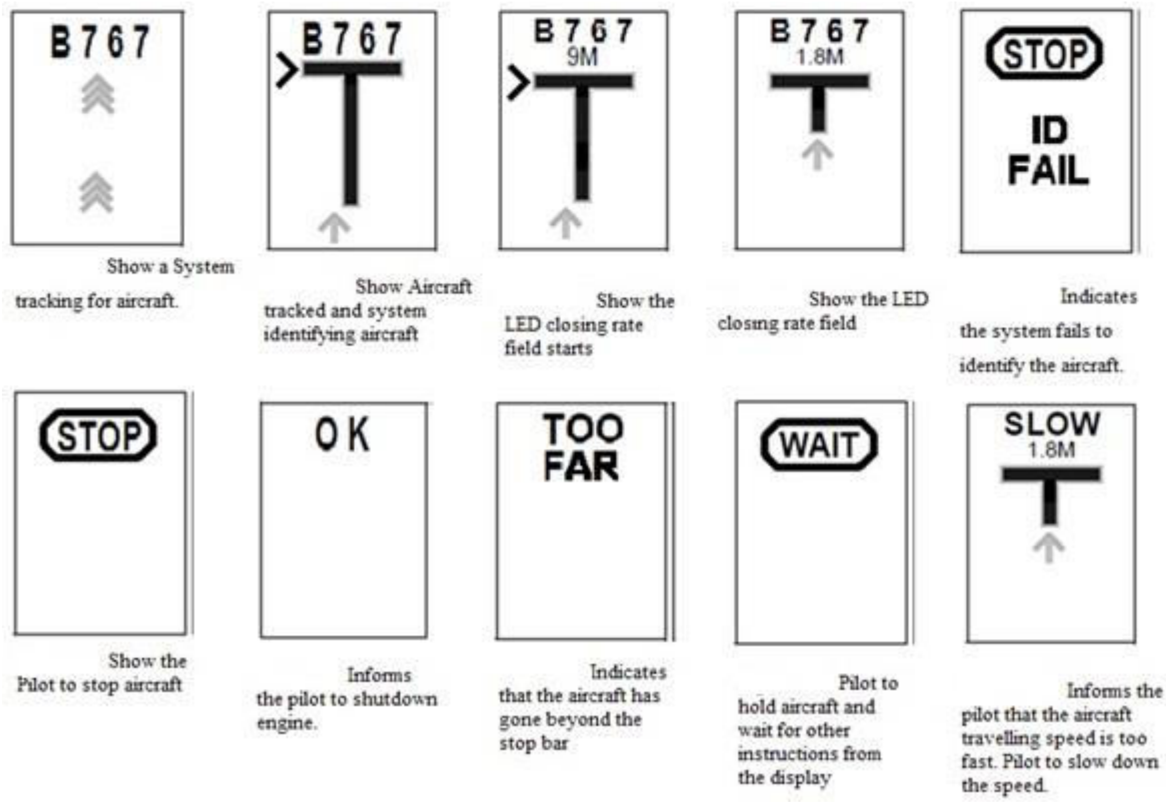

Figure 3: Docking procedures

Source: Aeronautical Information Publication (2012); Honeywell Airport Systems GmbH

Advantages of VDGS

1. It provides collision avoidance from static objects
2. It reduces staff resources
3. It shortens turnaround times of an aircraft
4. It reduces the operational costs of airlines
5. It reduces the level of damage caused by risks.
6. It enhances higher productivity
7. It enhances higher levels of safety (Honeywell Airport Systems GmbH).

Despite the capabilities and advantages of the system, it also contains some level of inefficiencies because it is a mechanical and electrical device. Whenever the systems work inefficiently, there will be ground personnel (marshaller) who will safely dock the aircraft in or out of the apron. In this research work, there is an assumption that the ground personnel will be the contingent which the system will be relying on should in case of contingency approach.

Disadvantages of existing docking systems

1. The installation is permanently fixed.
2. Loops have to be imbedded in the tarmac.
3. The system cannot distinguish aircraft and vehicles because it has been configured to the specification of an aircraft in terms of size, width, weight, nose angle, tires, size of propeller, and other unique features of an aircraft.
4. Each taxi line needs its own system installation and any changes are expensive to implement.
5. The systems can be sensitive to the wheel structural materials (Honeywell Airport Systems GmbH).

III. THEORETICAL FRAMEWORK

I. Attitude Theory

Attitudes are inclinations and feelings, prejudices or bias, preconceived notions, ideas, fears and convictions about any specific topic (Spacey and Attwell, 1998).Attitude is a mental and neutral state of readiness organized through experience exerting a directive or dynamic influences upon individual's response to all objects or situations with which it is associated (Allport,, 1935). This study explores the response and readiness of Ground Marshals towards the use of VDGS. Attitudes represent the conceptual value of these technologies in the minds of the Ground Marshallers, not the values of the technologies themselves.

Positive attitudes are fundamental in implementing new technologies (Spacey *et al*., 2004; Fine, 1994; Fine, 1986). It was discovered that there is a correlation between attitude toward technology and number of hours spent using a computer (Mathieson, 1991; Taylor and Todd, 1995).

Attitudes to VDGS and technology as a whole

According to Spacey and Attwell (1998), attitudes, mainly positive attitudes, are assumed to be fundamental in the acceptance, implementation and success of new technologies. Several literatures relating to peoples' views of technology are expressed in terms of attitudes to technology or attitudes to change.

For ICT systems to be successful, it is suggested that staff need positive attitudes to ICT (Fine, 1994). Attitudes have been suggested to influence behavior but research in this area is varied. Social psychologists, submitted in the Theory of Reasoned Action (TRA) that individual's behavior is determined by ones' intention to perform the behavior, and that this intention is influenced jointly by an individuals' attitude and subjective norm (the latter is a measure of how people are influenced by their peers' opinions) (Fishbein and Ajzen,1975).

Information has been the major drive of innovation through communication technology. There are different automation solutions introduced in aviation in order to maintain on time, secured and low cost air services to meets the needs of the fast moving society. Meanwhile technological change generally increases productivity, it is a tenet held in economics since the 19th century, although it disrupts the careers of individuals and the particular firms, it produces opportunities for the creation of new unrelated jobs. Technological change has an effect on productivity and structural unemployment and has been subjected to different and contradicting views in particular with respect to the role that full computerized automation can have on jobs (Adeniran, 2016).

According to Adeniran (2016), economists based their belief on two assumptions;

1. That machine is used as tools to increase workers production and most workers will be able to operate those machines.
2. That the increase in computerized automation can destroy works in a disruptive way in which most workers will have the capabilities of carrying out new jobs.

The fear of automation is rather like a fear of collision with an enormous rock. But it is not a harmless fear. It do harm in two ways;

1. It provides a convenient excuse for those who are unwilling to face up to the unemployment problem which already in existence and which have little to do with technology.
2. It diverts attention from two or more interesting questions that do arise from the progress of automation, and need to be thought about (Adeniran, 2016). Many of these categories of people are unwilling to face up to the unemployment problem when they look at the horrible lives of people living on the streets and might be discouraged.

II. Technology Acceptance Model (TAM) and Theory of Planned Behaviour (TPB)

Technology Acceptance Model (TAM) and Theory of planned behavior (TPB) are among models that have gained attention and confirmation in a wide array of areas and applications to understand end-user's intention to use new technology and systems (Venkatesh*et al*., 2003). Although TPB and TAM have not been widely applied to examine adoption and acceptance of Information Technology (IT), TPB nor TAM has been found to provide consistently superior explanations or predictions of behavior (Taylor and Todd, 1995; Venkatesh *et al*., 2003).This may be due to the various factors that influence technology adoption, type of technology and users and the context (Chan and Auster, 2003).

Consequently, a growing body of research has focused on integrating TPB and TAM to examine technology adoption owing to the complimentary and explanatory power of the two models together (Chan and Auster, 2003; Aboelmaged, 2010; Chau, 1996; Hung, Chang and Yu, 2006). According to TRA, behavioral intention to exhibit a particular behavior is formed based on the individual's attitude toward the behavior and on perceived subjective norm. The TRA posits that behavioral intentions are a function of two basic components:

1. Attitude towards the behavior

This is viewed as a personal factor and it is determined by what an individual believes; the outcome of performing the behavior will be (behavioral beliefs) and the positive or negative evaluation of those outcomes (outcome evaluation). The more positive the attitude, the stronger the behavioral intention and, ultimately, the higher the probability of a corresponding behavior should be. Attitude toward using this system is a major determinant of the intention to use that system, which in turn generates the actual usage behavior.

The underlying premise is that individuals make decisions rationally and systematically on the basis of the information available to them (Ajzen, 1991). Many existing studies in the context of technology acceptance have shown that individual's attitude directly and significantly influences behavioral intention to use a particular technological application (Gribbins, Shaw and Gebauer, 2003; George, 2002).

2. Subjective norms

These are a social influence and they are the person's perception of the social pressures put on him to perform or to not perform the behavior in question (normative beliefs), weighted by their motivation to comply with these normative beliefs. In the TRA version, questions about beliefs, outcome evaluations and normative beliefs were asked, also, questions about perceived vulnerability, perceived severity and benefits and barriers towards safe were asked (Venkatesh and Davis, 2000).

Direct link between subjective norm and intention to use in the study have been established. Subjective norm is a strong determinant of behavioral intention towards e-docking. In the context of this model, demographic variables focused on in this research are education and experience.

The second theoretical grounding for this research is derived from the TAM, which is initially developed by Davis as an extension of Ajzen and Fishbein's TRA to explain and predict particularly IT usage behavior across a wide range of technologies and user populations. TAM has received much attention from researchers and practitioners as a parsimonious yet powerful model for explaining and predicting usage intention and acceptance behavior.

III. Effects of Perceived Usefulness (PU) and Perceived Ease of Use (PEU) on attitude

Perceived usefulness is the extent to which a person believes that using a system (or computer programme, for example) will enhance effective performance, whilst perceived ease of use is the extent to which a person believes that use of the system will be free from effort. With respect to the acceptance of VDGS, perceived usefulness is the extent to which Ground Marshallers believes that using the VDGS will enhance efficiency of aircraft docking. Perceived ease of use is the extent to which Ground Marshallers believes that use of VDGS will be free from human effort.

These two constructs have an important impact on a person's attitude toward using the system but, unlike the TRA, Davis found that attitude did not completely mediate between beliefs and intentions (Mathieson, 1991). This suggests that an individual could hold negative attitudes to a system, but would still use it because it has high-perceived usefulness. A user who does believe him/herself capable of using an application will exhibit correspondingly a behavioral intention to use that application. It was predicted that perceived behavioral control would positively impact behavioral intention of users to search online (Shim *et al*., 2001).

IV. METHODOLOGY

I. Research Design

This research explores only primary data. Descriptive statistics was adapted to examine the perception of Ground Marshals towards the acceptance of VDGS in selected Nigeria airports because of the nominal and ordinal types of statistical data. Questionnaires were adopted as the research instruments for primary data collection which were targeted at Ground Marshals in the airport terminals.

II. Sampling Technique and Population

The sampling technique is a purposive (non-probability) sampling. The sampling itself is an incidental sampling. This was appropriate for this study due to time and resource limitation to fill out the questionnaire. Responses were gathered from Ground Marshals at Murtala Muhammed International Airport 1 (MMA1), Murtala Muhammed Airport 2 (MMA2), and Ilorin International Airport terminal.

In this case, the exact population is unknown; hence, to realize a sizable sample size for this study, the statistical formula that was postulated by Taro Yamane (1967) was employed. The formula is shown as:

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

Where n= sample size; N=population size
e=level of precision/sampling error at 0.224

Sample size for Ground Marshals in the selected Airports is

$$n = \frac{8{,}006}{1+8{,}006(0.224)^2}$$
$$\approx 20$$

III. Method of Data Analysis

The questionnaires were structured in line with the objectives and hypotheses of the study. Data were collected in respect to the following:

1. To examine if technological change will cause a threat on the ground marshalling job; the question was asked if technological change will cause a threat on the ground marshalling job. This was analyzed with descriptive statistics. The hypothesis was analyzed by Chi-Square Test.
2. To determine the education level of Ground Marshals towards the knowledge and acceptance of ICT devices. This was analyzed with descriptive statistics. The hypothesis was analyzed with Chi Square Test.
3. To ascertain the relationship between level of ICT usage and the acceptance of ICT devices. This was analyzed with descriptive statistics. The hypothesis was analyzed with Chi Square Test.

V. FIGURES AND TABLES

I. The Threat of Technological Change on Ground Marshalling Job

Table 1 revealed that 40% respondent agreed that the advent of technological change will cause a threat on the ground marshalling job, also 40% respondent believed that the advent of technological change will not cause a threat on the ground marshalling job, and 20% were not sure of whether technological change will have a negative effect or positive effect.

Table 1: Will technological change cause threat in ground marshalling job

Valid	**Frequency**	**Percentage**
Yes	8	40.0
No	8	40.0
Not Sure	4	20.0
Total	**20**	**100.0**

Source: Field Survey, 2019

In-line with this, the Null Hypothesis was tested using a Chi Square test.

The Null hypothesis (H_0) states that there is no association between the opinion that technological change will cause a threat in ground marshalling jobs and the awareness of Ground Marshallers about ICT; The opinion that technological change will cause a threat in ground marshalling jobs is depending on the awareness of Ground Marshallers about ICT. The desired level of significance or critical region is 5% (0.05); therefore the confidence level is 95% (0.95).

The computed test was determined with the use of Chi Square (P. *Value* = 0.033). Based on this test, the P. *Value* is less than critical region 0.05 which signifies that the null hypothesis was rejected; hence there is an association between the opinion that technological change will cause a threat in ground marshalling jobs and the awareness of Ground Marshallers about ICT. It is therefore noted that

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further exposure of Ground Marshals to ICT training will help them accept technological innovations such as aircraft docking. This will also help to cope in the upcoming Fourth Industrial Revolution, when there will be full digitization, Artificial Intelligence (AI), and Internet of Things (IoT).

II. Education Level of Ground Marshalls towards the Acceptance of VDGS

Figure 4 revealed that 65% of respondents are highly educated with the holders of the tertiary education degree. This positively influences their perception and acceptance of ICT devices.

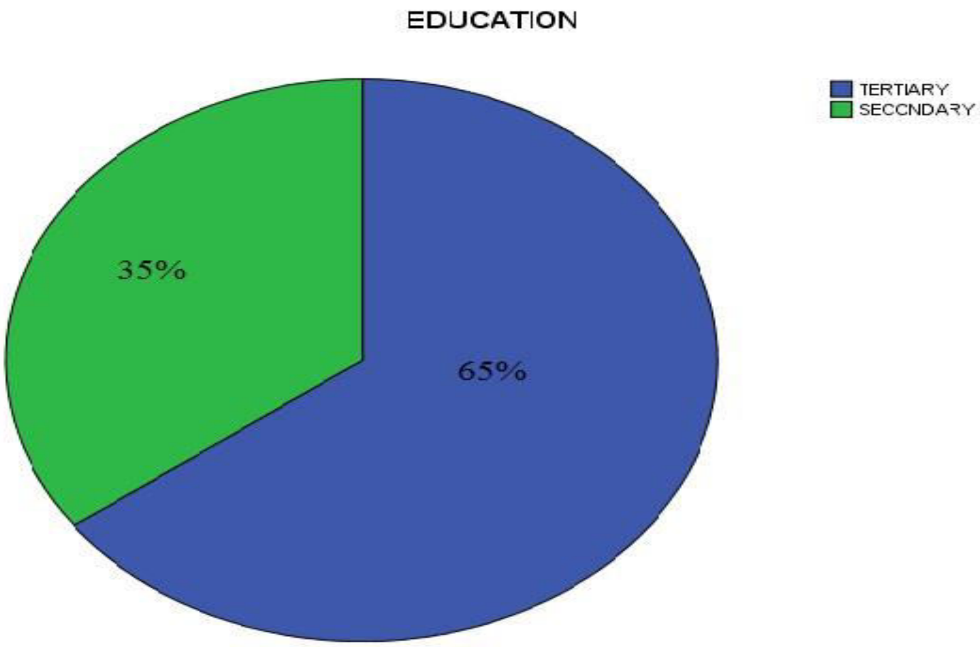

Figure 4: Education level of respondents

Source: Field Survey, 2019

From Table 2, 45% of respondent perceived that they will accept VDGS if fully introduced to their work environment, while 30% of respondent were not ready to accept the introduction of VDGS.

Table 2: Acceptance of VDGS

Valid	Frequency	Percentage
Yes	9	45.0
No	6	30.0
Not Sure	5	25.0
Total	**20**	**100.0**

Source: Field Survey, 2019

In-line with this, the Null Hypothesis was tested using a Chi Square test.

The Null hypothesis (H_0) states that there is no relationship between the acceptance of VDGS and the education level of Ground Marshals. Acceptance of VDGS is depending on education level of respondents. The desired level of significance or critical region is 5% (0.05); therefore the confidence level is 95% (0.95). The computed test was determined with the use of Chi Square Test (P. *Value* = 0.021). Based on this test, the P. *Value* is less than critical region 0.05 which signifies that the null hypothesis was rejected; hence there is a relationship between the acceptance of VDGS and the education level of Ground Marshals. It is therefore noted that this result is quite similar to the previous test. If airport organization could organize periodical training for the Ground Marshals and other airport workers, the better for them to accept and cope in the upcoming Fourth Industrial Revolution, when there will be full digitized, Artificial Intelligence (AI), and Internet of Things (IoT).

III. Determination of Association between the Acceptance of VDGS and the Awareness of Ground Marshallers towards Ict Usage

The association between the acceptance of VDGS and the awareness of Ground Marshals towards ICT usage was analyzed with the Chi Square (P. *Value* = 0.005). Based on this test, the P. *Value* is less than critical region 0.05 which signifies that the there is an association between the acceptance of VDGS and the awareness of Ground Marshals towards ICT usage. It is therefore noted that this result is quite similar to the earlier two tests. VDGS is a form of ICT which without the knowledge of ICT, it will be difficult to be embraced.

VI. CONCLUSION

The study examined perceptions of Ground Marshals towards the acceptance of the Visual Docking Guidance System in Nigeria airports. Due to the global nature of the air transportation system and the high involvement of technology in air transport, it is pertinent to carry out this study.

The findings revealed that there is a relationship between the opinion that technological change will cause a threat in ground marshalling jobs and the awareness of Ground Marshallers about ICT; also, there is a relationship between the acceptance of VDGS and the education level of Ground Marshallers; and there is an association between the respondents' knowledge of ICT and the likely acceptance VDGS. All the three hypotheses goes side-by-side as the education level has to do with knowledge about ICT and VDGS, and the knowledge of ICT has to do with embracing VDGS.

Finally, to further buttress on the proved fact that there is relationship between the knowledge of ICT and the believe that technological change will cause threat in ground marshalling job, it was discovered in the study that if the Ground Marshallers have in-depth understanding of ICT and proper awareness of VGDS, their believe on technophobia will be minimized; but on the other way round, if they have less understanding about ICT, they will see technological changes has great threat on their job. It is therefore expedient that as the air transport operations continue witnessing rapid technological changes and the fact that the Fourth Industrial Revolution is fast approaching, there is a need for the Ground Marshallers to be fully conscious of disruptions that have been predicted whereby higher percentage of human jobs will be replaced by Artificial Intelligence (AI) hence, there is need for proper training on ICT usage which is the only way out to tackle the challenges that might evolve during the technological change.

Airport organization should developed and adopt automation processes to improve their operational efficiency such that they will be better placed to focus on human involvement in technology processes. Management strategies for human involvement in the aircraft ground marshalling become vital for developing and implementing the air transport policy. The policy context and content regarding aircraft docking will enhance efficiency, safety, reliability of aircraft docking and reduce turn-around time of aircraft on air-side. Aircraft ground marshallers should be involved in decision making process, programming, application of standard procedures and practices, and developing basic maintenance tasks

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